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Advanced Management

MODERN MANAGEMENT

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Management Implies Leadership

MANAGEMENT *is the development of people, not things.*

A realization of the full meaning of this principle as the base on which all management must stand or fall would have prevented many of the economic, social and personal tragedies of the last half century. It is easy enough for us to believe this today, but our acceptance of this idea has been relatively recent. The record of our country and our economy gives ample justification for this statement.

Ours is by far the wealthiest nation in the world. Yet we must ask, "Has this great wealth, the product of our American enterprise system brought happiness and contentment?". We must regretfully answer, "No".

The technological progress which we have made has been outstanding, but our human relations developments have not kept abreast of our technical development. Our failure to develop the science of human relations step by step with our technological advancement has created many problems, difficult of solution.

If we now subscribe to the idea that *management is the development of people,* then the task we face is clear. We must carefully analyze the history of our industrial progress and study the effect which this progress has had on people, the methods employed by management and the results they produced and the errors made. We must then develop a plan of action to promote the kind of cooperation which has been so much a part of our industrial efforts in the early days of our development. This is not an impossible assignment, rather it is well within the realm of possibility. Strange as it may seem in these days of troubled relations at home and abroad, people want to cooperate. It is natural for people to want to cooperate because the satisfaction of the social desires which motivate people require cooperation.

If management is to perform effectively its function in the development of people, it must plan accordingly.

And here is a responsibility of all levels of management—to make sure that they themselves and subordinate levels of management are not so completely involved in details of the paper work or the mechanics of their jobs that there does not remain time for the effective performance of the leadership function—the most vital of all managerial functions. There are many complaints about the lack of effective leadership at all levels of management—many times when these individual cases are analyzed "too much detail", "too much paper work", "too much manual work", consumes valuable time which should be devoted to leadership—the real purpose of management, the primary function.

IF we assume the original objectives and policies to be sound, the organization structure and plan must be so devised as to permit the cooperative functioning of the organization members.

The supervisor—each level of management from the top executive officer down to the level of face to face supervision—becomes the key to success in our efforts to develop full cooperation. The task of each supervisor is:

first—to eliminate all interferences with the full functioning of those for whose performance he is responsible;

second—through his familiarity, knowledge, and understanding of any technical problems involved to aid and advise in their solution;

third—through effective leadership to provide for the adjustment of each individual to the work situation and more particularly to the group of which he must be an integral and coordinate part.

In the discharge of his leadership responsibilities, he must treat each person as an individual and yet each must be considered and treated not in isolation, but as a functioning unit of the group of which he is a part—team work in its full sense is the ultimate of cooperation. It is a subordination of personal interest to the interest of the group.

Someone has said, "Man is a spirit temporarily using a body for self expression." Management's job in developing people is to permit that self-expression to the fullest extent possible in keeping with the group objectives.

DILLARD E. BIRD

The Impact of Korea on America's Economy

A Special Survey of Interpretative Comments

by	**Dr. Leo Barnes**	Chief Economist, Prentice Hall, Inc.
	Bernard M. Baruch	Advisor to Presidents
	Stuart Chase	Author
	Henry Hazlitt	Newsweek
	C. F. Hughes	Business News Editor, New York Times
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	Jackson Martindell	President, American Institute of Management
	Donald I. Rogers	New York Herald Tribune
	Dr. Charles F. Roos	Econometric Institute, Inc.
	Dr. N. I. Stone	Economist
	Alfred H. Williams	President, Federal Reserve Bank of Philadelphia

By LEO BARNES
Chief Economist, Prentice Hall, Inc.

BLUEPRINT FOR ACTION

INTENSIFIED rearmament program means record civilian as well as military business in the years ahead. Almost all lines of activity are heading for the biggest boom in U. S. history. Stalin has put any possible U. S. recession in mothballs indefinitely.

Virtually all business indicators are due to break through a new postwar high in the fourth quarter. *Because it takes time to expand defense production impact of rearmament on civilian output will be gradual and piecemeal in 1950.* A moderate squeeze on hard goods output probably won't begin until 1951. Our revised projections of major business indicators appear in detail below. Highlights in the business outlook for the second half of the year include the following:

1. *Output.* Industrial production will soar to new postwar highs this fall. In terms of the Federal Reserve Board Index, total industrial output will break through the 200 mark in September or October (1935-39 = 100). The production boom will send 1950 above the previous record year of 1948. *As a result of the step-up in business activity, total gross national product in the second half will rise to an all-time record rate of $285 billion per year or more.*

2. *Construction.* While housing will be moderately curtailed in the second half as a result of tighter credit and some market saturation, industrial and military building will be very strong. With such building offsetting the drop in housing, it's unlikely that total construction activity will be down more than 5-6% in the second half from record first-half levels.

3. *Trade. Record levels of employment and spendable income would mean record retail sales—entirely apart from the "rush to buy" due to war fears.* Rising prices will also send dollar volume upwards. As a result, soaring soft goods sales will far more than offset any decline in hard goods due to supply shortages. With soft goods sales averaging 8-10% above first half levels on a seasonally adjusted basis, total retail sales in the second half should be running at a new all-time high of about $140 billion per year. Department store sales, as measured by the Federal Reserve Board, will consistently average over 300 (seasonally adjusted, 1935-39 = 100).

4. *Jobs.* Employment is pretty sure to average above 60 million throughout the second half of the year. More jobs plus higher draft calls mean that unemployment will drop under 3 million once again, despite expansion of the labor force. *The job market, particularly for skilled help, will be even tighter than in 1946-48.*

5. *Prices.* With buying power run-

MILITARY BACKGROUND

Much has been written about the magnitude of the job that must be done in Korea. Here is a summary of the essentials as viewed by the staff of Fortune.
It is against the background of these physical requirements that we must evaluate the economic impact on American business and industry.

THE U. S. must make four distinct military efforts, all expensive.

We need now:

1. A defensive force capable of combating Soviet air or submarine attack on continental American targets and indispensable offshore bases, and protecting supply lines to the bases and to our overseas sources of critical raw materials. Primarily this means fighter planes, naval air and surface units, radar screens, and anti-aircraft guns and missile launchers.

2. A strategic bomber force capable of instant retaliation against Soviet attack.

3. The cadres of total mobilization. This means staff, supply, and training units larger than the present combat strength of the armed forces would warrant, selective-service machinery, National Guard and Naval reserve programs, etc.

4. Striking forces—air, ground, and naval—ready to handle the Korean type of operation.

from "FORTUNE August 1950; Copyright Time Inc."

ning ahead of output, both wholesale and retail prices are due to continue steadily upward throughout 1950. Wholesale prices will probably average 8-10% higher in the second half than in the first half of this year. The Bureau of Labor Statistics index will probably top 170 (1926 = 100) this fall. The cost-of-living index moves more slowly than the wholesale price index, but is likely to be up to 175 (1935-39 = 100) by winter.

By ALFRED H. WILLIAMS
President, Federal Reserve Bank of Philadelphia

The magnitude of the defense requirements generated by the Korean crisis is still indefinite, but the direction of their impact on American business is clear. The President has already requested over $10 billion more for defense purposes. In addition, military aid of an undetermined amount is to be given friendly foreign countries.

This stepped-up defense program hits the American economy when it is already riding the crest of a boom. Inflationary pressures had already made their appearance and were pushing prices up even before the outbreak of fighting in Korea.

The immediate effect of the Korean crisis is strongly inflationary. It adds substantially to the total demand for goods at a time when industry is unable to add a corresponding amount to the total supply.

The longer term outlook will be influenced greatly by the steps we take to divert both productive facilities and current income from the civilian sector to the defense sector. Men, materials, and plant must be shifted from civilian production in sufficient quantity to meet defense needs. It is important also that immediate steps be taken to hold down the demand for civilian goods and for Government services not essential for national defense. Such action facilitates the transfer of some of our resources from civilian to defense production, and helps to prevent inflation.

Financing the defense program out of current income means that the Treasury must obtain the Funds from taxation and the sale of Government securities to nonbank investors. In view of the high level of income and the large Federal debt, it is especially important to raise as much of the money as possible by taxation. A second step in holding down the demand for civilian goods is to restrict the use of credit for non-essential purposes. It is just as important to limit spending from future income as from current income.

Our success in imposing voluntary restraint should largely determine the steps the Government will need to take. Our job as consumers and businessmen is clear. Industrial management should cooperate fully to see that defense production is in no way hampered by lack of men, materials, and plant facilities. Some priorities and allocations, either voluntary or compulsory, will be necessary. It will be necessary for consumers to do without some goods which they could have otherwise. To the extent that we use self-restraint to accomplish these tasks, Government restraint will not be necessary.

By HENRY HAZLITT
Newsweek

THE effect of the Korean crisis on American business may depend less upon the crisis itself than upon the economic policies followed by the Administration. There will in any case, of course, be a change in the structure of American industry, in the sense that more war goods will be produced and fewer peace goods. But how much inflation we will have, how much increase in taxes, how much allocations and price controls, will depend on what the government decides to do.

It would be possible for it to cut back greatly on non-military expenditure, to cover necessary expenditures with increased taxation, and to avoid over-all price control by putting into effect real credit control. This would mean a stopping of the government's bond support policy, a halt to its policy of artificial low interest rates, and restraint both on the credit granted by the Federal Reserve Banks and by the commercial banks. These policies are incomparably more important in their effect on credit and inflation than mere control over consumer installment credit.

By C. F. HUGHES
Business News Editor, The New York Times

Memories were still fresh concerning war-time shortages and the first effect of the Korean crisis was "scare buying" by consumers and something more or less similar in industry. The initial fright, however, has now worn off as attested by reduced percentages of gains in retail sales over last year.

Piling a war upon a business boom was bound to have some such results although our public does not stay scared for very long because it has a full appreciation of the tremendous productive power of our industry. What is short today is quite plentiful tomorrow.

However, inflationary tendencies were noted even before the Communists moved into South Korea. The administration will attempt to stem this tide chiefly through fiscal and credit control measures. Housing loans will be less liberal. Instalment buying will doubtless be returned to a war-time basis with higher down payments and curtailed paying periods. Furthermore taxes will be jumped to meet mobilization expenses.

Soft goods lines may benefit from the credit restrictions to be imposed on durable. It is believed that some of the high level current business is being "borrowed" from fall volume.

In heavy industry the demands of the armed services may jump say 10 to 15 per cent but they will fall far short of the 50 per cent required by our full war-time output. Component shortages may cause headaches again.

By BERNARD M. BARUCH

". . . without price control the Government may get what it wants, but with needless delay and ever increasing prices.

". . . the gravest threats to the preservation of the American system today are not government controls. They are military defeat abroad and further inflation at home.

"We dare not blind ourselves to the fact that we are in a race against the enemy—and, so far, are lagging in that race."

By CHARLES F. ROOS
President, the Econometric Institute, Inc.

War demands, prices, and taxes: Before the outbreak of war in Korea, capacity consumption of American products was indicated for the fourth quarter of 1950. This of itself meant a rise in the domestic price level because:

(1) High cost marginal mills would have to come into pro-

duction;

(2) Overtime premium pay would have to be substantially increased to obtain the production levels indicated; and

(3) Capacity output always induces conditions of sellers' markets.

In these circumstances any net addition to demand arising from Korean activity or otherwise would necessarily be inflationary. In particular, adding $10 billion to the annual budget of the military without change in tax rates would cause prices to increase 4% to 5% above the normal pre-Korean expectations of a 2% to 3% rise by next spring. Thus if there were no change in tax rates, the price level would rise by 6% to 8% by next spring.

To accommodate the military demand without abnormal price increases and the inevitable wage increases, it would be necessary to increase both personal and corporate taxes. Before the Korean difficulty personal income in fiscal 1951 was likely to average at least $226 billion, or $16 billion above the fiscal 1950 average. With added military demand this income is likely to rise to an average of $228 to $230 billion. This additional income would yield additional federal taxes, at present rates, of about $2½ billion. Under the conditions of sellers' markets that are now indicated, corporate profits in fiscal 1951 will be at least $6 billion higher than in fiscal 1950. Consequently under present tax rates the increase in yield from this source would be roughly another $2½ billion. In view of this $5 billion increase in federal revenue, a 12 per cent across-the-board increase in personal and corporate tax rates would seem to be the best solution at present. Under such taxation and such a budget, controls would not be necessary.

An excess profits tax would constitute a blundering handicap to the enterprise system in its struggle against the ideologies of government control, socialism, and communism. This kind of tax, which all too much favors the ne'er-do-well of the past, would produce long-term harmful effects on the economy.

An all-out war with Russia would constitute a serious long-term threat to the American economy. It would require so many controls and so distort economic relations that it would be difficult if not impossible to restore our enterprise system. The United States would dictate the peace but lose the war.

By N. I. STONE
Economist

THE immediate effect of the Korean War is already clear — it is spread on the front pages of the daily papers: it means a tremendous industrial boom superimposed on the greatest peace-time boom in the history of this country with a much enlarged steel plant working at full capacity and other basic industries keeping in step.

As a corollary of this situation, prices which were high before the Korean explosion, have immediately started to climb. As the Administration in Washington sees no need for price control until, to quote the President, "A sharp rise in prices should make it necessary," it may be confidently predicted that we are in for a spectacular race between union labor and the commodity markets, each trying to outdo the other.

How sharp the rise in prices will have to get before the Administration takes the inevitable step is not clear. One thing, however, is perfectly clear: when it does, it will be following the age-old practice of locking the stable door after the horse had been stolen. The country will "pay through the nose" for this gratuitous spur to war inflation on top of a peace inflation. With a growing shortage of labor as mobilization gets under way, a sharp rise in wages for both union and non-union labor is inevitable, unless the Government freezes wages. Such a step is inseparable from a freeze of prices, a step Bernard Baruch has been pleading with the Government, in and out of season, to take as soon as war breaks out.

LONG-TERM EFFECTS

The long-term effects will depend on the length of the war and the steps which the Administration may take to control inflation. If the conflict develops, as is quite likely, into a trial of strength between the United States and Soviet Russia, it will take a long time, unless abruptly ended by a revolution in Russia. The effects of a long war may be expected to resemble those following World War II. A long war will severely try our strength — military, industrial, civic — to a greater extent than any previous war. It will leave the nation with a staggering debt which may cause a severe depreciation of the dollar.

Unless Russia succeeds in bombing this country, the war should leave us with a greatly enlarged industrial plant and equipment and a tremendous demand for consumer goods enlarged in proportion to the length of the conflict. It should be followed by another peace-time boom like the one that followed World War II.

By JACKSON MARTINDELL
President, American Institute of Management

WHEN fighting broke out in Korea I made a tour of Washington to check upon official thinking as to how business would be affected. In department after department in our Federal Government, top officials confirmed my premonition that, even should the fighting remain localized, the American economy would be largely a war economy for many years to come.

Washington estimates that in the coming 12 months no less than $25 billion will be spent for war purposes. This is based upon $13 billion of military and quasi-military expenditures in the 12 months preceding the Korean outbreak, plus the $10 billion called for in the President's message to Congress, and $2 billion of added costs which inevitably will be incurred. This is going to be a background for greater inflation.

These figures offer a clue as to how business in general is going to be affected. Paradoxically, they warn us that the earnings and asset values of well managed corporations are going to be impaired by this shift to war. The 1950 earnings of excellently managed companies have been bolstered by the rational inventory policies they have pursued. The average well managed company has kept its inventory to a minimum and, in the period of price uncertainty through which we have just passed, has been buying on a hand to mouth basis. Replacements, therefore, will be at higher costs and, in fact, will be hindered by the allocation of strategic materials forecast in the President's message to Congress. Inferior managements, by contrast, bemoaned excessive inventories some weeks ago. The losses they were threatened with have turned overnight into profits.

This same pattern of benefit to badly managed companies and injury to excellent managements is bound to be

felt in all forms of business activity. The average corporation in 1949-1950 showed a return on net worth of between 10% and 12% after taxes. In 1939, the average corporation earned a net profit of between 5% and 6% on its net worth. Yet in both 1939 and 1950 inferior managements were earning substantially less than this average, superior managements substantially more. The tendency, therefore, will be for leading and well managed companies to accept substantial government orders as a patriotic duty but to subcontract as much of them as possible in order to retain the largest possible proportion of civilian business. Necessarily this means that smaller corporations with inferior management will be given a boost in earnings while threatened excess profit taxes and higher costs will eat into the profits of our leading companies.

We are going to experience a repetition of what happened in 1941 and 1942 when war orders came as a bonanza to inept managements incapable of meeting ordinary competition and as a blow to those companies which had spent millions of dollars in building up their peace time markets. As in 1941-1945 the effect of war orders is going to be felt in a general weakening of management caliber, a slackening of competitive vigor, and a strengthening of financial rewards for slip-shod operations.

This is one of the gravest war dangers we must guard against. Even in a war economy, reward must be for effort alone — something difficult to achieve when sales are made without effort and high taxes cushion the consequences of managerial weaknesses.

By STUART CHASE
Author

1. For the short term, a return to the creeping inflation of 1946-48.

2. For the long term (assuming mobilization continues), the reenactment of war controls which will check inflation as in World War II. We know how to stop inflation. Every major belligerent did it successfully in the last war, and I doubt if we will be foolish enough to throw those skills away.

By ARNO H. JOHNSON
Vice President and Director of Media & Research, J. Walter Thompson Company

We entered the Korean conflict with business and production in the United States at their highest peacetime level in history and with very good prospects for continued increases in the second half of 1950 and throughout 1951. The levels of employment, purchasing power, and consumption reached in June 1950 were quite in contrast with the pessimistic predictions current in the fall of 1949 and spring of 1950.

It now seems obvious that these high levels of 1950 were not just a result of replenishment of inventories after the unnecessary inventory scare of 1949—but rather we have begun to experience that upward surge in the standard of living of the American people that has been a latent possibility and opportunity ever since World War II proved that our productive ability is far in excess of the prewar concepts of living standards and civilian consumption.

For years we have been underestimating the market potentials in America. In the "*Mature Economy*" days we planned on a future of heavy unemployment and a leveling of the standard of living. It took a world war to prove our productive ability—a productive ability that if utilized in peacetime could support a standard of living double the 1940 standard, and at least a third better than our present level.

The present conflict, while it may temporarily convert an important share of some industries to production for war, cannot alter the basic fact that Americans must learn to live a third better than at present within the next 5 years. Otherwise they will not be taking advantage of even the minimum opportunities that are within their reach.

By DONALD I. ROGERS
N. Y. Herald Tribune

It behooves businessmen to be wary. Controls undoubtedly will be imposed on the nation's economy if the Korean flame is fanned into its potential holocaust. There are those, however, who will seize the excuse of war to instigate needless, throttling controls which, without the emergency, could never be foisted on the American public.

Because economists have said that higher taxes (including an excess profits tax) would help curb inflation, it does not follow that such taxation is *desirable* in curbing inflation, or that it should be an instrument of Government in clubbing prices back to more popular levels.

A corporation tax does not check inflation or rising prices. Corporations are producers of goods. High taxes check their production. If consumption gets beyond the productivity of the corporations, the way to correct this misalignment is to either curb consumption or increase production. Nothing about a corporation tax will bring this about.

BY LEON H. KEYSERLING
Chairman, Council of Economic Advisers

THE only deficiency in public discussion and understanding since the Korean outbreak is this: The discussion has concentrated so much upon the problem of controls, upon how we can divide what we now have between military and civilian use, upon how we can resist inflation while so doing—and all of these are essential *parts* of our task—that we are in some danger of neglecting the even more important problem of production and more production. The leading principle which should stamp itself upon our national economic policies at this time should be this: We need controls, but we cannot hope to outcontrol the dictators. We can continue to outproduce them, and this above all is what we must do.

As we get ready for a long and hard pull, industry should redouble its efforts to make use of new inventions, to expand its plant and equipment, and to turn out more goods. The productive resources of our industries, both large and small, are tremendous if fully utilized. Government should concentrate upon encouraging and stimulating the full use of these resources. Many methods used for this purpose during World War II—including loans and incentives and certain types of tax consideration—should be adjusted and adapted to the current situation. We must tool up for the job ahead.

Control of inflation . . . is an essential part of the battle of production.

The first and foremost remedy for this situation, is to drain off the excessive purchasing power by higher taxes and by credit restrictions. Legislation toward this end is now pending, and additional proposals will be needed to raise taxes still more. The public should realize that the cost of defense *must* be borne by the people.

Industry's Stake in Public Relations

By LEROY H. KURTZ

Department of Public Relations
General Motors Corporation, Detroit, Michigan

The basic public relations principles of a giant corporation are designed for "small" daily contacts in many communities. Local harmony can lead to improved national understanding of the business system by which we all earn our living.

INDIVIDUALLY, most industrial organizations stand well in the eyes of their customers, employes, and the general public. But because the economic system which has made the success of these institutions possible is not generally understood, the whole system and the prosperity which it has brought are threatened.

Groups of leading business men, meeting all over the country, agree on one thing—that they, the greatest salesmen in the world, are singularly inept in selling the system which provides the goods in the marketing of which they are so skillful.

Now we may say that this makes no sense. Or we may note with Goethe, that man is an animal that learns early and acts late. Or we may observe with the African bushman that one can eat an elephant only by cutting it into small pieces.

If *all* industry would only duplicate in every city and town in the country what is being done in some cities by individual business and financial organization, how soon the job would be done!

IMPORTANCE OF PUBLIC CONFIDENCE

As Mr. Paul Garrett, Vice President of General Motors and one of the recognized leaders in the field of public relations, suggests, each industrial and financial institution has an area of influence in which it can contribute to a better understanding of the relation of the American business system to each individual's standard of living. To make such a contribution the institution itself must naturally have the confidence of the public.

I suggest that this task be approached in four phases.

Phase 1—Find out what people in your town think of you.

2—Adopt policies that will emphasize your interest in your employes, customers and neighbors.

3—Draft and execute a program in line with these adopted policies.

4—Make your policies and practices known.

It is valuable to study both the thinking and techniques of various companies that have undertaken actively to fulfill their community responsibilities.

Here is an outline of the basic principles pursued by General Motors.

GENERAL MOTORS PROGRAM—THE POLICY

Quite naturally we put most emphasis on relations in our plant communities. Here most of our employes live as well as work; here also much of our own business is done. We are an important part of many of these communities, and we try to be good neighbors. The Corporation has officially stated as a matter of policy its desire that its executives assume a proper share of social and civic responsibility in keeping with good industrial citizenship.

PLANT CITY COMMITTEES

As one means of implementing this policy in GM, committees composed of local GM factory executives appointed by President C. E. Wilson, meet regularly, usually monthly, in these plant cities, to discuss public and employe relations and community problems and to agree upon any needed local action.

What is done naturally varies greatly. In one city a committee may decide to assist in a traffic safety study. In another it may get behind a drive for a badly needed new hospital. In still another it may lend to the local school board several of its top technical people to assist in drafting the design for a new school building and to advise regarding its financing. In a fourth, a committee member may chairman the local Community Chest drive. People who are carrying on the work of the community whether as part of the local government or as volunteers, have heavy burdens, and welcome the assistance of experienced business men in sharing them. GM plant managements have learned that whatever affects their fellow citizens, affects themselves, the company and its employes, and they are trying to be helpful neighbors. So senior GM plant executives naturally participate in the work of local civic organizations and social agencies, and junior executives and other employes are encouraged to be helpful in such activities whenever possible.

ADVERTISING AND PUBLICITY

What happens in our plants is news in the community, so we try to keep our neighbors informed through the local press of interesting occurrences. Increases in production, changes in the working force, prize awards for suggestions (GM paid $687,000 for such suggestions this last year), promotions, important anniversaries of employes, retirements, visits of Corporation officials, safety records (GM won in 1949 for the 6th year the National Safety Council's award of honor), and similar news stories are relayed promptly through the local newspapers. Several series of newspaper advertisements have explained the nature of GM's local operations and their contribution to the community.

The plant employe magazines are also given wide distribution among thought leaders in the city. These give much news of interest to the community and explain management's position on important matters.

PLANT VISITS

Many of our neighbors like to visit our plants to watch our people at work and to study the processes of production. While some people drop in from time to time and are guided through the plant, we find that most respond to an Open House announcement.

Sometimes we arrange for the families of our employes to visit the plants while the head of the household is on the job, so he may show them what he does from day to day.

While some educators may attend one of our Open House parties, we try to make it possible for them to get a closer and more intimate picture of our operations. Such an occasion is Business-Education Day, an event in several of our plant cities this year in which groups of teachers spend the day meeting the local GM executives, and touring the plant.

At such meetings before the plant tour, executives give a brief history of the operation, describe the product and the principal production processes. Facts regarding employment, including number of years employes have served, working conditions, promotion policy, safety record, suggestion system, wage rates, volume of sales, purchases (particularly of local material), total pay roll, taxes, contributions, and other points of community interest are presented.

Charts, slides or films clarify the story and help the visitors frame intelligent questions as to policies or operations at the closing discussion period.

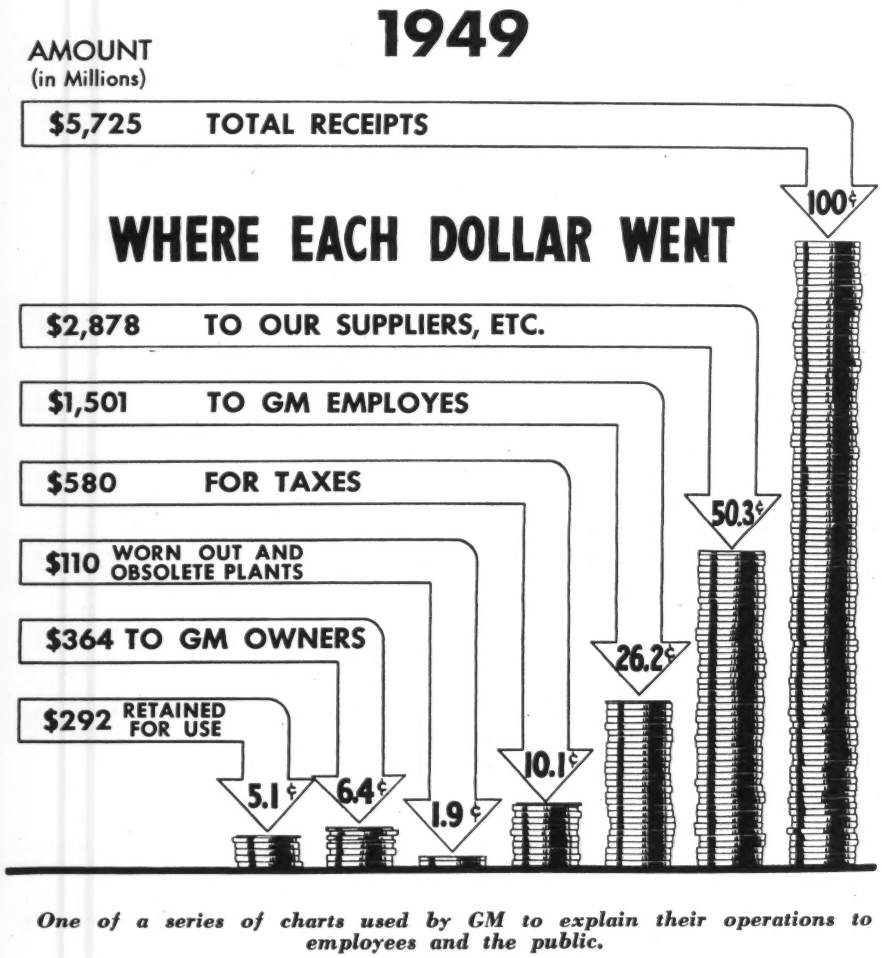
Started in Lansing three years ago and sparked by two educators and the Manager of the Lansing Chamber of Commerce, Business-Education Day is now an annual affair in over 50 cities. All of the teachers in each city visit in small groups its principal local industrial, business and financial institutions.

During the 1950 Business-Education Day in Lansing, over thirty local businesses were visited, including the city's three banks. All did a fine job of entertaining and educating their group of teachers.

S. E. Skinner, General Motors Vice President and General Manager of the Oldsmobile Division, personally devoted the entire day to participating in this activity. More than 100 teachers visited the Oldsmobile factory and another large group visited the Fisher Body plant. Shortly thereafter the school system reciprocated and the business man spent the day behind the scholastic scenes.

Some of the educators, clergy and professional people, even legislators, who participate in Open Houses, and who have never previously had an intimate contact with industry are quite surprised to find how differently it operates from what they had imagined, how much attention is paid to the comfort and safety of the workers, how closely the management-labor team cooperates to benefit alike the employe, the stockholder and the buying public.

They also have learned much of the practical everyday problems that confront the industrial manager in his efforts to keep the plant going, to get in all supplies needed on time, to plan for new machinery to cut costs, to meet competitive prices, to design ever better products to sell for the same or less money. This so-called competitive enterprise system of ours is not understood or appreciated by trying to pic-



One of a series of charts used by GM to explain their operations to employees and the public.

ture it as a complex nationwide machine. But it can be grasped when one sees how a single business unit carries on, whether it be a small organization with a few people, such as a retail store, a middle-sized company locally owned and operated, or a large corporation with many operating divisions in various communities.

If I were a small grocer with my only employe a delivery boy I would have a weekly session with him to explain the facts of my business operation and the threats to my future and to his from those who, whether with good will or bad, would meddle with our system of earning a livelihood. If I were a larger employer my program might be different, but I'd have one—and I'd help personally to get the job done. And if all the other business men in town and in other towns did the same, we would soon change some current trends.

For in my opinion if more people knew how a successful business operates, knew how it *has* to operate to be successful, we would have less loose criticism of finance and industry, and more demands that business, the breadwinner of the nation, be allowed to operate more freely, to the advantage of all. Actually, today, business that does not operate in the public interest is soon identified and forced off the road.

OTHER GM ACTIVITIES

In addition to its program in its plant communities GM promotes periodic discussions with its own personnel in the field, and the dealers who sell its products. Those attending these meetings are brought up to date on the company's thinking, activity and plans. They are encouraged to keep in touch with other leaders in their communities and to interpret to them the aims of our Company and what it is doing to provide more and better things for more people.

The GM stockholders are kept fully and frequently informed of the Corporation's activities and progress in line with its policy of giving the facts. General Motors has for 30 years furnished a detailed annual report as well as quarterly financial reports and was probably one of the first companies to do so. A message to stockholders discusses events at the Annual meeting, and one or two special messages from the management are also usually forwarded each year.

A growing GM Film Library of sound pictures dealing principally with semi-technical, safety and human interest subjects is in constant demand, particularly by the schools.

Educators make considerable use also of GM's semi-technical booklets and charts describing the country's ever-improving system of transportation, how the machines used in this system are constructed, and the most significant new technical developments.

A speakers' bureau in GM's central office at Detroit assists many business and other groups to procure General Motors speakers.

GM's policy of constant research, technical improvement and the building of better value into its products is brought to public attention through various activities. GM's caravan, *The Parade of Progress*, aimed at the future, was seen by millions in the USA in the late thirties. Its famous *Futurama* at the *New York World's Fair* a decade ago had a nationwide impact. During the past two years 6,000,000 people all over the USA visited the *GM Train of Tomorrow* which was developed as a service to GM's railroad customers and to the travelling public.

Today several units of its *Previews of Progress* are playing before schools, service clubs and civic groups. This is a stage science show that dramatizes advances in research and engineering, and points to the opportunity for all to participate in the development of a never-finished world.

The Corporation's present institutional advertising campaign in leading magazines tells of its efforts to provide greater values for its customers. The *New York Auto Show* at the *Waldorf* in January, and the *Motorama* at the *Chicago Museum of Science and Industry* now on exhibit, are two more activities that bring GM's contribution to transportation and industry to public attention. GM's *Fisher Craftsmens' Guild*, and *Chevrolet Soap Box Derby* are examples of industry's public relations in the youth area. Still others are GM's support of the *4H Clubs* through sponsorship of their *Farm Safety* program, and its cooperation with the *Future Farmers of America*. These organizations are real buttresses of American life. GM dealers are urged to give them assistance.

To summarize, I believe that if a company

(1) establishes sound Public Relations policies;
(2) puts its policies into action;
(3) informs its employes, and encourages them to become vocal in explanation of the company and its operations;
(4) reaches and informs interested citizens in areas in which it operates and its employes live;
(5) corrects any misunderstanding of the company's policies and practices;
(6) sets up to tell the story of current operations;
(7) makes itself in fact a good neighbor,

it will have gone a long way to provide for both harmonious local relationships, and a good reputation elsewhere. Furthermore, it will be helping people get a badly needed sympathetic understanding of the business system by which we all earn our living.

A prominent pollster says that his researches convince him that people give their confidence to those who appear to be working in their behalf, even if they make obvious mistakes and foster plans that do not always pay off.

This explains why advice of sound business men, who in the course of conducting their own operations sensibly have benefited the community, but who have kept their light under a bushel, is sometimes disregarded in favor of the rantings and promises of dreamers or incompetents whose only claim to favor is that they mean well.

So for his own and his company's good as well as that of the country, every business man has the responsibility and duty to clarify the economic thinking of the people in his own home town. This includes of course particularly his employes, but the other members of the community should not be neglected.

When managers accept this responsibility they will find that their own employes and a large part of what they consider the general public will begin to appreciate and sympathize with their efforts to solve the problems of the day, instead of blaming them for both the emergence of such problems and the intensification of them caused by the radicals clamoring for their solution.

Industrial Application of the Ratio-Delay Method

By DONALD S. CORRELL
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A factual analysis of the "Ratio-Delay" technique in actual practice. New light on an important application of a basic theory. Of special interest to management men faced with problems related to expanding production schedules.

THE determination and measurement of the interruptions or delays which interfere with the flow of production is a perplexing problem in most industrial plants. These interruptions may occur as a result of working conditions, material processes, operator performance, or improper supervision. In any well managed plant an attempt is always made to eliminate these delays or at least to minimize them. It is unreasonable to assume that all delays may be eliminated, since in the normal process of production it is not always possible to anticipate these delays before they actually occur. Hence, it is necessary through some method to determine and measure the interruptions that occur.

The problem of measuring these interruptions is especially important in a plant employing a wage incentive system. The basis of a wage incentive system is to pay the worker in proportion to his productivity. One of the factors influencing his productivity is the occurrence of interruptions or delays. As a result, daily productive output is seldom the result of the total time per day divided by the normal time per piece found by timestudy.

Since many of these delays occur through no fault of the worker, he should not be penalized for them. Therefore, an allowance must be made for time lost because of unavoidable interruptions, variations, or delays.

The need for a more accurate and economical system of measuring these interruptions has long been recognized by many industrial engineers. Recognizing the need for a better method of determining and measuring delays and interruptions, *L. H. C. Tippett*[1] devised a statistical method which he used in the English textile industry. Later *Robert L. Morrow*[2] made several industrial studies in this country using this technique.

There has been a very limited amount of material published pertaining to this statistical technique and conclusive results have not been presented concerning the reliability or validity of this method. There also has been a lack of information regarding the problems that are encountered in applying this technique to industrial situations. For these reasons, the authors felt that an investigation of these factors should be made as an aid in evaluating the Ratio-Delay method.

Hence, an objective study of the theory and applications of the Ratio-Delay method was designed. The three principal factors considered were the reliability, validity and practicability of this method when applied to actual industrial operations.

THEORY OF THE RATIO-DELAY METHOD

The Ratio-Delay method is similar to the random sampling theory employed in statistical quality control.

The method consists of selecting samples at random from a large group and when a sufficient number of samples have been selected, a prediction is made for the whole group.

The determination of delay allowances by Ratio-Delay is based upon the theory that the percentage *number* of observations recording the operation in the delay state is a reliable estimate of the percentage *time* that the operation is in the delay state, if sufficient observations are taken.

Briefly, the procedure consists of making observations at random intervals of a department or group of machines and noting whether the operation is in the productive or delay state. If the operation is in the productive state, it is given a mark under production; if it is in the delay state, the type of delay is determined and it is given a mark under delay. This mark is keyed to signify the type of delay. The delay percentage is the ratio of the number of delay marks to the number of productive marks if the delay allowance is based upon the productive day. If based upon total day, the ratio is number of delay marks to number of total marks.

Tippett states: "If the readings are distributed at random over a sufficiently long time this percentage is accurate regardless of whether the delays are long or short, many or few, regular or irregular." [3]

PRELIMINARY PROCEDURE RATIO-DELAY STUDY

The first step in determining delay allowances by the Ratio-Delay method consists of analyzing the operations

[1] TIPPETT, L. H. C., "Statistical Methods in Textile Research. Uses of the Binomial and Poisson Distribution. A Snap-Reading Method of Making Time-Studies of Machines and Operatives in Factory Surveys," *Journal of the Textile Institute Transactions*, Vol. 26, February, 1935.

[2] MORROW, R. L., "Time Study and Motion Economy," p. 175, Ronald Press, New York.

[3] Tippett, L. H. C., *op. cit.*, p. 75.

which are to be covered. Machine classifications should be listed and then subdivided into groups of similar operations. By this it is meant, the classifying of the operations into homogeneous groups for which a single delay percentage may be found. For example, lathes may be divided into groups of turret lathes, engine lathes, or gang turret lathes. Drill presses may be divided into groups of single drills, gang drills, or multiple spindle drills. The determining factor in deciding the number of divisions into which a classification should be separated is the amount of variation in delay percentage which may be expected within the group itself. For example: Lathes may vary greatly in the delay allowance necessary from simple engine lathe work, to the most complicated gang turret lathe work. If necessary these classifications might be further sub-divided into operations such as turning, facing, or boring on a lathe. In all cases judgment should be employed in dividing these groups into the smallest practical classification for which a single delay percentage will be calculated.

PROCEDURE FOR RECORDING OBSERVATIONS

The procedure employed for recording observations is as follows:

(1) Observations of each department or group of operations to be covered are made at random intervals.

(2) At the exact instant that the observer notes each operator, the state of the operation, working or delay, is recorded.

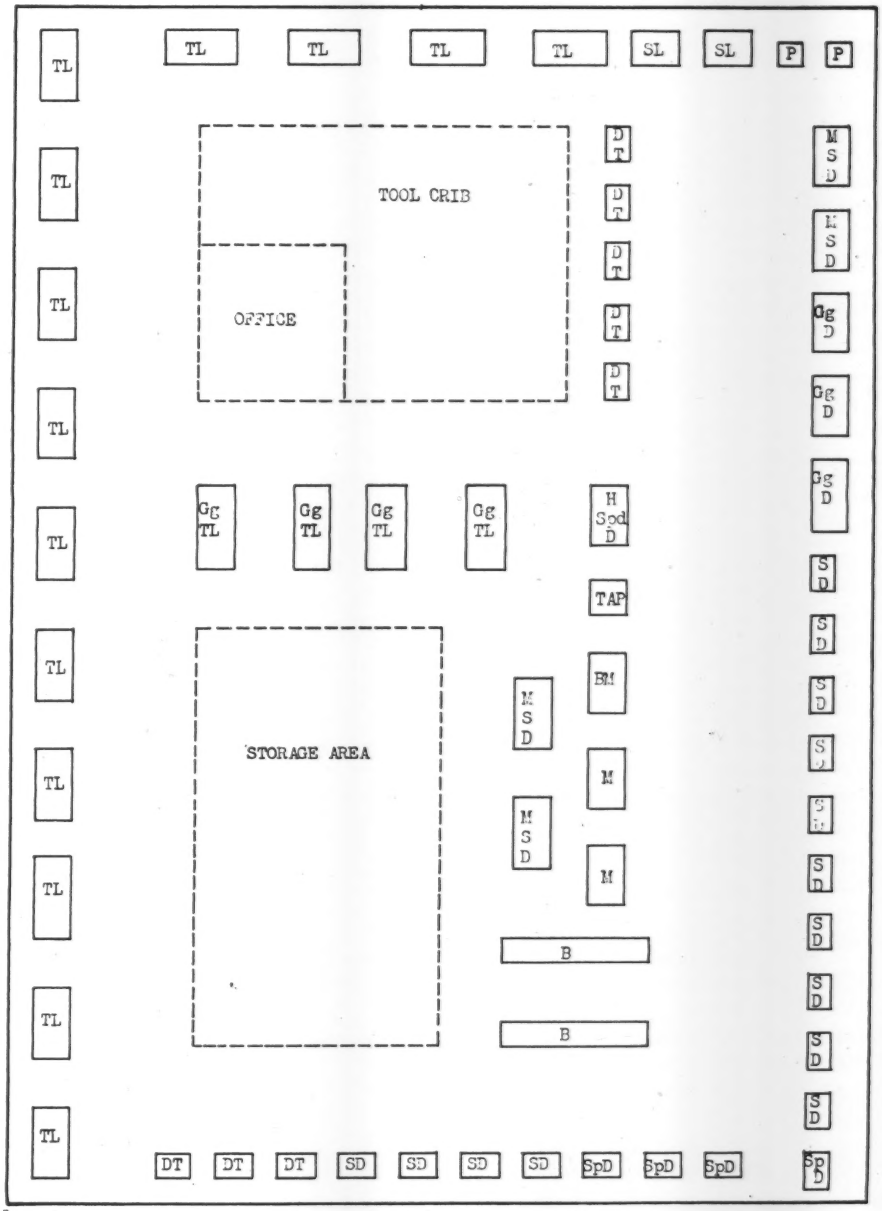
(3) If the operation is in the productive state, it is given a mark under productive state; if it is in the delay state, the type of delay is determined and it is given a mark under delay state. This mark is keyed to signify the type of delay.
For example:

STATE		OCCURRENCE
Production	𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸 𝍸	40
Delay Key Numbers	2 - 1 - 5 - 4	4

There are forty productive observations and four delay or non-productive observations. The type of delay may be identified by consulting the Job Interruptions Key which follows later in this paper. In this example, the delay percentage would be $4/40 \times 100 = 10\%$ (based on productive day).

(4) The number of observations to be taken depends upon the occurrence and variation of the delays that are found. A sufficient number of readings must be taken to obtain a true percentage. A large number of observations is recommended to reduce the chance of error. The necessary number to be taken will be shown in the calculations which follow.

DEPARTMENTAL LAYOUT OF MACHINE SHOP (STUDIES NO. 1 & NO. 2)



MACHINE CODE LETTERS

EL	—	Engine Lathe	SpD	—	Speed Drill
TL	—	Turret Lathe	DT	—	Drill and Tap
SL	—	Stub Lathe	B	—	Broach
P	—	Air Press	M	—	Milling Machine
MSD	—	Multiple Spindle Drill	BM	—	Boring Mill
GgD	—	Gang Drill	TAP	—	Tapping Machine
SD	—	Single Drill	HSpdD	—	High Speed Drill
			GgTL	—	Gang Turret Lathe

(5) To obtain a representative sample, observations should be taken at random times throughout the working day and during different working days. To assure that this principle is followed, a log or record should be kept which indicates time of observation.

PRECAUTIONS FOR RATIO-DELAY STUDY

There are certain precautions that must be observed so that a biased sample will not be obtained.

(1) Productive and delay states must be clearly defined and a definite decision of the state must be made instantly. Delays should not be anticipated.

(2) The observations must be taken at truly random intervals. Care must be taken to avoid making periodic stops which coincide with the clock as this may result in the recording of the same cyclical delay each round. A scheduled rest period is an example of a cyclical delay. Sufficient time must also be allowed between rounds so that the same delay is not recorded twice.

(3) Long delays should be only recorded once as the Ratio-Delay theory is based on the percentage number of delays rather than their length. If sufficient readings are taken, this relationship holds whether the delays are long or short.

(4) The application of the results of the study must be considered in determining periods during which observations are recorded. Hence, a percentage delay to be applied in determining delay allowances for incentive work may most accurately be based upon observations recorded only during periods of incentive work. If the nature and duration of the delays of incentive and hourly-paid employees are similar this precaution may be disregarded.

(5) A sufficient number of readings must be taken to decrease the sampling error to within acceptable limits. The greater the percentage of delays, the greater the number of observations that are needed.

(6) Production records should be checked for the period of the study to determine if results were obtained during a normal period of production.

(7) The operators should be informed of the study and instructed to carry on their work in a normal way.

(8) In calculating results, only homogeneous groups of data should be combined.

CALCULATING DELAY ALLOWANCES

A sample calculation is given to clarify the delay allowance computation and the statistical interpretation of it.

In determining the percentage delay allowance, care must be taken to assure that the allowance is calculated in the same manner that it is applied. In the method used in this paper the delay allowance is applied to normal or productive time, hence, the delay allowance is calculated as a percentage of productive observations.

Example No. 1:

Productive Observations	(P)	= 600
Delay Observations	(D)	= 30
Personal Observations	(Per)	= 20
Total Observations	(N)	= 650

$$\text{Percentage Delay Allowance} = \frac{D}{P} = \frac{30}{600} = 5\%$$

The magnitude of the sampling variations may be estimated by computing the standard error of the percentage. From this standard error it is possible to estimate the number of observations that are necessary for the desired accuracy.

$$\text{S.E.} = \sqrt{\frac{p\ (1 - p)}{N}}$$

where S.E. = standard error of a percentage
p = percentage expressed as a decimal [4]
N = the total number of observations upon which "p" is based

[4] This "p" must not be confused with the percentage delay allowance. Percentage delay allowance is not used in the calculation of the standard error since it is only derived as a means of applying the percentage to productive time. The "p" used in the calculation of standard error is based upon the total number of observations, rather than the number of productive observations.

The desired limits of accuracy used in industrial studies were arbitrarily established at the 5% level of confidence, allowing a maximum variation in obtained delay percentage of ±2.5%. It was felt that a ±2.5% variation in delay percentage would not appreciably effect production and that carrying the accuracy to any higher degree would be uneconomical. In any case, the desired level of confidence and allowable variation may be determined and the corresponding number of observations necessary to give results within these limits may be taken.

Calculation of Limits of Accuracy (for Example No. 1):

$$p = \frac{D}{N} = \frac{30}{650} = .046$$

$$\text{S.E.} = \sqrt{\frac{(.046)\ (1 - .046)}{650}} = .0082$$

At the 5% level of confidence, the error will not exceed 1.96* x S. E. or 1.96 x .0082 = .0161. Hence, the limits of accuracy are "p" ± .0161 = .046 ± .0161 or .030 to .062. Since the variation (± .0161) is within the chosen acceptable limits of ± .025, a sufficient number of observations have been taken for our desired accuracy.

*From statistical tables showing Per Cent of Total Area Under the Normal Curve Between Mean Ordinate and Ordinate at Any Given Sigma-Distance from the Mean. See Lindquist, E. F., *A First Course in Statistics*, p. 87 from *Tables for Statisticians and Biometricians*, Edited by Karl Pearson, Cambridge University Press.

(Part II will appear in the September issue of ADVANCED MANAGEMENT.)

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Keeping Up with the Business Cycle

By GEOFFREY H. MOORE

National Bureau of Economic Research

Correctly interpreting the behavior of certain significant indicators in relation to Business Cycles might lead to useful conclusions. Research points the way to some of the figures considered worth watching.

WHAT are the chief characteristics of the alternate waves of prosperity and depression modern industrial countries go through? How do these fluctuations in aggregate economic activity come about? To answer these questions the *National Bureau of Economic Research,* a non-profit organization engaging in fundamental research in economics, has for many years been making a systematic study of business cycles. From time to time the results of parts of the study have been summarized so that they could be put to use, either in formulating private or public policies or in further research by others.[1] Recently we brought together some of the materials and measures developed for the long range study in order to answer the specific question: "What statistical series seem, on the basis of past performance, most likely to give some sign that a business expansion or contraction is near its end?" I shall attempt here to summarize the chief results.[2]

We define a business expansion (or contraction) as a certain type of fluctuation in the aggregate economic activity of a nation—one that is accompanied by an expansion (or contraction) at about the same time in many types or aspects of economic activity, and lasts, taking the expansion and contraction together, from more than one year to ten or twelve years. The United States experienced five such business cycles between 1919 and 1938. The dates when the successive expansions and contractions in aggregate activity culminated, and the lengths of these phases, are shown in table I below.

The expansion that began in 1938 continued through World War II. The mild decline in activity during the transition to peace in 1945-46 might perhaps be considered a business cycle contraction, similar to the one from August 1918 to April 1919. However that may be, expansion was resumed in 1946, and continued until the autumn of 1948. In 1948-49 the economy experienced a contraction clearly of the pre-war type. It was quite similar, in both length and magnitude, to that of 1923-24.

SIGNIFICANT INDICATORS

The durations of previous business expansions and contractions give one only a very rough idea of what may be expected, since they vary so widely. Only when averages are struck for considerable periods of time does an appreciable degree of stability emerge. The average expansion in 1919-38, for example, lasted 25 months, the average contraction, 21 months. The averages for 16 previous cycles, 1854-1919, were: expansions, 27 months; contractions, 22 months. The range of variation in the length of individual phases is so great, however, that averages are of little help to one who is concerned with trying to find out when the current phase is going to end.

Do any signs appear during a cycle by which we might identify the present stage and judge the future course? What is the usual order of events in the vicinity of a cyclical revival or recession? Our study of indicators provides a partial answer to these questions by focusing attention on economic processes that have behaved in relatively systematic fashion in the cycles for which we have records. The results can be thought of as a development of two chief facts about cyclical revivals and recessions.

Trough	Peak	Trough	Length, in Months: Expansion	Contraction
Apr. 1919	Jan. 1920	July 1921	9	18
July 1921	May 1923	July 1924	22	14
July 1924	Oct. 1926	Nov. 1927	27	13
Nov. 1927	June 1929	Mar. 1933	19	45
Mar. 1933	May 1937	June 1938	50	13

Table I

[1] See, for example, the volumes in the National Bureau series Studies in Business Cycles: Wesley C. Mitchell, *Business Cycles: The Problem and Its Setting* (1927); Arthur F. Burns and W. C. Mitchell, *Measuring Business Cycles* (1946); Thor Hultgren, *American Transportation in Prosperity and Depression* (1948); and Moses Abramovitz, *Inventories and Business Cycles* (in press). A brief account of our recent results in this field is given by Arthur F. Burns in "New Facts on Business Cycles," *30th Annual Report of the National Bureau of Economic Research* (May 1950).

[2] For a fuller account see my "Statistical Indicators of Cyclical Revivals and Recessions," *Occasional Paper 31* (NBER, 1950), a revision and elaboration of *Bulletin 69* (1938) by Wesley C. Mitchell and Arthur F. Burns.

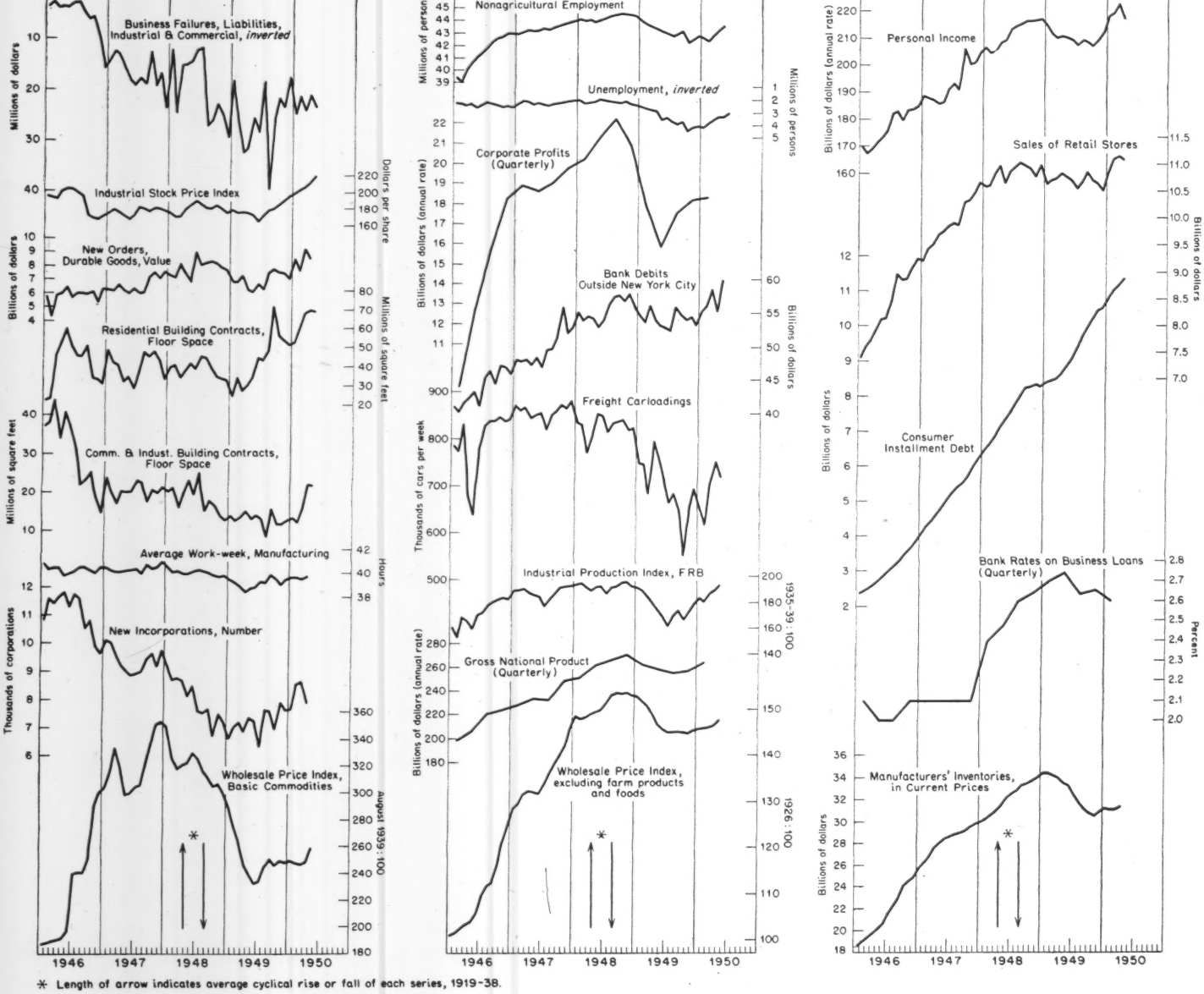
The first fact is that a cyclical revival or recession is a process requiring considerable time to work itself out, rather than a sudden and unique event. One way to describe the process statistically is to record the months in which different types or aspects of economic activity reach cyclical peaks or troughs—that is, the highs and lows not of the brief "sawtooth" movements that most economic series exhibit, but of the broader swings that are roughly of the same order of duration as business cycles. Whether this is done for a collection of production or employment series in different industries, or profits of different firms, or prices of different commodities, or a wide variety of economic processes, what we find historically is that the peaks (or troughs) in the series are clustered around certain points in time but with considerable dispersion.[3] Declines in some elements in the economic system precede, often by a year or more, cyclical declines in aggregate activity as measured, say, by national income, or by total employment; other factors continue to expand until long after the decline has become general. Similarly, at revivals expansion starts to appear here and there in the economy long before the movement becomes sufficiently general to cause aggregate activity to cease declining and start rising, and the expansion continues to spread for some time thereafter. The implication is that by studying from this standpoint the current behavior of different aspects or components of economic activity at large we may get early notice of cyclical reversals in aggregate activity.[4] More-

[3] The reader who wishes to see the evidence for this phenomenon in different sorts of data may find it in several National Bureau publications: F. C. Mills, *The Behavior of Prices* (1927), pp. 395-405; A. F. Burns and W. C. Mitchell, *Measuring Business Cycles* (1946), pp. 66-71; A. F. Burns, "New Facts on Business Cycles" (May 1950), pp. 4 ff; Thor Hultgren, "Cyclical Diversities in the Fortunes of Industrial Corporations," *Occasional Paper 32* (1950).

[4] An interesting development of this idea, following different lines, was reported by C. Ashley Wright in a paper presented at the Conference on Business Cycle Research, National Bureau of Economic Research, November 25-27, 1949.

Chart 1

Behavior of Selected Statistical Indicators, 1946–1950



* Length of arrow indicates average cyclical rise or fall of each series, 1919-38.

over. when a reversal has already been observed in, say, total production, or employment, or an index of business activity, knowledge of how widely diffused it is may give an important clue to the nature of the movement, i.e., whether it is cyclical and likely to continue, or whether it is episodic.

SELECTING THE SERIES

To make the most effective use of this characteristic clustering and dispersion of turning points some care should be taken in selecting the series to be observed. Obviously, the series should have a significant bearing on the course of economic activity. They should be such that their cyclical turning points can be easily spotted and do not deviate too erratically from the turns in aggregate activity. Our study of statistical indicators has produced several sets of series that possess such characteristics, and their use will be illustrated below.

The second chief fact about cyclical revivals and recessions is that they reflect a fairly systematic sequence of events. Certain types of economic activity tend to turn up early in revivals, others late. Again by a process of selection we can discover the series that are relatively systematic in this respect, and put them to use.

Such sequences are to be expected in economic time series for many reasons. New orders for durable goods and construction contracts tend to move earlier than the direct and indirect activity to which they give rise, since it takes time for this activity to get started and be carried out. Average hours worked per week tend to change before the number of men employed, since it is usually preferable at first to shorten or lengthen the work week than to lay off or hire new employees. Certain commodity prices tend to move more promptly than others, dividend payments tend to lag behind corporate earnings, failures of small businesses tend to follow those of large concerns, and so on. The intervals vary widely, depending on what is being compared. They also vary widely from cycle to cycle; indeed, circumstances often cause a series that usually leads to lag at a particular turn.

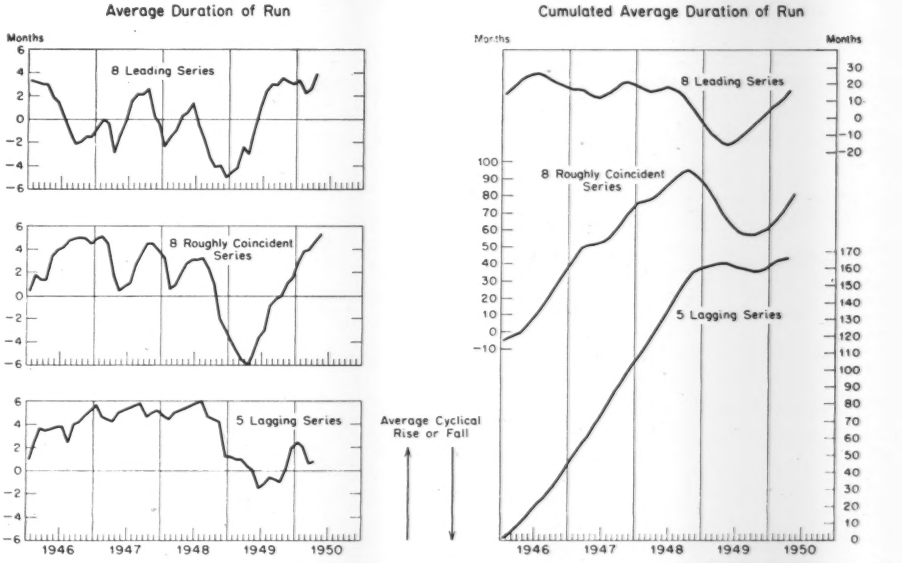
TIMING AND VERIFICATION

Both because of the variety of reasons for sequences and the uncertainty attaching to particular sequences at any given time, it is desirable to utilize groups of series with different timing characteristics rather than rely on, say, a single 'leading' series. Moreover, it is essential to verify the expected sequences continuously by observing the followers as well as the leaders. Consequently in the study of statistical indicators we have set up three groups of series: those that tend to lead at revivals and recessions in general business activity; those that tend to coincide roughly with the turns in aggregate activity; and those that tend to lag.

To illustrate how the two features of cyclical revivals and recessions — the clustering and dispersing tendencies exhibited by individual series, and the tendencies towards repetitive sequences — can be combined and utilized we present charts showing the behavior during 1946-50 of 21 selected indicators classified in the three timing groups just mentioned.[5] These series, or their historical equivalents, have possessed in notable degree the characteristics we have suggested would be useful in connection with the clustering phenomenon, and also have exhibited relatively systematic differences in timing. That is, each of the series has tended to conform systematically to business cycle expansions and contractions, and to reach relatively clear cyclical turning points; but the clusters of peaks (or troughs) in the different groups of series have tended to center on different months. The selection was based on cyclical measures that extended over as many cycles as the series covered prior to 1938. Hence the behavior of the series after 1938 really tests whether the series' characteristics have persisted beyond the period examined in making the selection.

Chart 2 contains two forms of summary of the movements of each group of series. The two summaries represent attempts to utilize the cluster-dispersal tendencies exhibited by the group of series from which they are derived. Lack of space precludes a full explanation of their construction or rationale.[6] The general idea, however, is simple.

Chart 2
Summaries of the Behavior of Selected Statistical Indicators
1946–1950



APPRAISING MOVEMENT OF SERIES

Obviously it is important, in appraising the current movement of a series, to consider how long it has been moving in the same direction. A rise for five months in a row is usually more significant, so far as cyclical movements are

[5] The series are plotted on arithmetic scales selected to equalize the average cyclical rise or fall of each series (or its historical equivalent) during 1919-38. In other words, if during 1946-50 each series rose or fell as much as it did on the average during the interwar cycles, each would cover the same vertical distance on the chart (indicated by the arrows). This scaling device does not, of course, alter the data, but merely helps one to judge the magnitude of current movements in each series relative to its own past behavior. The same device is used in Chart 2, except that slight differences in average amplitude are ignored in order that the scale be the same for each summary curve.

[6] See *Occasional Paper 31*, App. A. The present chart is based, however, on the new list of indicators given in Table 12 of the *Occasional Paper*, rather than the older list used in App. A; the periods (in months) of the moving averages used for the 21 indicators, in the order in which the series appear in Chart 1, are: Leading group—6, 4, 6, 6, 6, 4, 6, 3; roughly coincident group—2, 5, 3, 6, 5, 2, 3, 2; lagging group—2, 4, 1, 3, 1.

concerned, than a one-month rise. The 'average duration of run' gives expression to this fact. First, each series is smoothed by an appropriate moving average (see note 6); then the number of months that the smoothed data have been rising (or falling) is recorded. Suppose that on this basis hours of work have been rising for 2 months, new orders for 3, and new incorporations for 4; the average duration of run for the three series would be +3 months. If in the next month the smoothed data for the first two series continued to rise and the last began to decline, the average would be $\frac{+3+4-1}{3}$ or +2 months.

The figure simply tells how many months, on the average, the group of series has been rising (+) or falling (—). Runs of six months or more are counted as runs of six months; hence the average cannot rise above +6 or fall below —6.

As a rule, the average duration of run curves tend to be above the zero line when most of the series in the group are undergoing cyclical expansion, to decline when a cluster of peaks in the several series begins to form, to be below the zero line when most of the series are contracting, and to rise when a cluster of troughs begins to form. The second summary curve is derived merely by cumulating the average duration of run from month to month; that is, by adding the current month's average to the sum of all preceding months' averages. This curve is smoother than the other, and it tends to reach a maximum near the center of a cluster of peaks, and a minimum near the center of a cluster of troughs. Hence the peaks and troughs in the cumulated curve roughly mark the centers of the clusters, while the peaks and troughs in the non-cumulated curve record their beginnings.

These properties of the summary curves are subject to many qualifications. Their deficiencies cannot be elaborated here; for an appraisal the reader is referred to *Occasional Paper 31*. Since they use only a very small part of the information provided by the individual series, and use it in a rather arbitrary way, they can mislead as well as inform. Before attempting to interpret them, therefore, one should become thoroughly familiar with their construction and their behavior in earlier cycles.

So far as the period covered by the chart is concerned, it appears that at the downturn in 1948 the leading group tended to decline earlier than the roughly coincident group, and the latter somewhat earlier than the lagging group; at the upturn in 1949 the order in the cumulated summary curves are shown in table II below.

The post-war peaks in the leading group are spread over a considerable period; there is virtually no central tendency. In the other two groups the peaks are much more concentrated about the central dates specified by the cumulated summary curves. On the other hand, at the revival in 1949 the troughs in all three groups are rather closely concentrated around the dates indicated by the cumulated curves.

IDENTIFYING MAJOR MOVEMENTS

The charts demonstrate the fact, and historical data confirm it, that the individual series and our summaries as well make many false moves. Minor ripples in the stream of aggregate activity may be magnified many times in some series, and especially in the 'average duration of run,' though the cumulated average is relatively free of them. In view of this is it really possible, in judging the current business situation, to distinguish the minor from the major business movements?

We know of no sure way to do this. But certain procedures may help to prevent mistakes. First and foremost is careful study of the current behavior and previous history of each series. Have seasonal variations been properly eliminated? Have large 'erratic' movements occurred before? Do other series of the same general nature corroborate the movement of these indicators? When a series is subdivided into its components—by area, industry, size of firm, etc.—is the movement pervasive, or is it traceable to a single component? The more one knows about the underlying factors acting on a series and how they are affecting it currently, the better. This knowledge must go beyond the purely statistical, or even the purely economic, for public action can influence economic interrelationships and the course of economic activity.

Secondly, as far as the particular summary device, the average length of run, is concerned, historical experience shows that it fluctuates within a fairly narrow range during minor business upswings or downswings, but reaches more extreme values in the neighborhood of business cycle revivals or recessions. A slight decline in the average duration curve for, say, the leading group may be an early sign of a business recession, but it is not a very sure sign since the decline may be reversed. If the curve recedes further and reaches fairly large negative values, one can be more certain that the situation is one of recession. In 1948-49 the average duration of run for the leading group fell below —3.5 (which, in terms of historical data, is a fairly low value) in October 1948, when most indexes of aggregate activity (cf. the roughly coincident group) were at their zenith, and it reached +3.5 in October 1949, by which time most of the aggregates had reached their bottoms. Judging from the historical evidence one cannot count on the average runs, even for the leading group, reaching such extreme values as early in a revival or recession as in these recent instances. Furthermore, it must be noted that accurate data on runs cannot be strictly up-to-date, though estimates can of course be made. Consequently high negative average runs are not likely to be observed until *after* a business contraction has begun, or high positive averages until *after* a business expansion is under way. While these high values, therefore, will probably be of little help in *forecasting* the turning point in general business activity, they may confirm it at a relatively early date and in this way indicate that the emerging expansion or contraction will be of appreciable magnitude.

	Peak		Trough
Leading	July 1946; Nov. 1947	Leading	May 1949
Roughly coincident	Oct. 1948	Roughly coincident	Sept.-Oct. 1949
Lagging	Apr.-May 1949	Lagging	Oct. 1949

Table II

A third type of check on one's interpretation of the movements of indicators can be had by using the several groups to confirm one another. The leading indicators are, on the whole, more erratic than the roughly coincident or lagging series. If several leading indicators have turned down one can be more certain of the implications by waiting to see whether some of the roughly coincident series turn down too. Even the lagging series are useful in this connection, since they tend to be relatively insensitive to mild disturbances. But the price one must pay for greater certainty by this method, as by the preceding one, is delay in the prognosis—which may then become diagnosis.

POINTING THE DIRECTION

To sum up, the materials and methods we have sketched above can be expected to provide helpful signs of an approaching business revival or recession, and especially to facilitate prompt recognition of such a development once it occurs. This has to do mainly with the *direction* of the course of business. The mere recognition that a movement sufficiently sizeable to be called a business cycle expansion or contraction is at hand does not go very far, since these movements themselves vary so much in magnitude and duration. Why some depressions are brief and mild and others severe and protracted is a large and complex problem, and one that our study of statistical indicators was not designed to tackle. There is some ground for hope, however, that the broad investigation of business cycles mentioned at the beginning of this paper will make a useful contribution to this vital question.[7]

[7] See Arthur F. Burns, "New Facts on Business Cycles," Section VIII.

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Every Man An Enterpriser

By LANSING P. SHIELD

President, The Grand Union Company

A timely reminder that there are many areas into which profit-sharing can be successfully extended. Participation in policy-making responsibility and profit-sharing rewards are two of the foundation stones of this dynamic plan.

IF our goal for American business is greater strength, our major effort must be toward greater productivity. The logical place for us to start on productivity is with our own employees. There are thirty-seven million of them each having a family. Together they add up to over half our population. These millions can be made champions of our system if their own experiences convince them that the American way is worth fighting for . . . if they realize that the loss of the American way of doing business means the destruction of the American way of working, living, and playing.

How are we going to get all these people to help in strengthening American business? The obvious way is to make our thirty-seven million employees participants in our business. The obvious way is to encourage them to be enterprisers in their own right.

The time is past when our employees can be held at arm's length while the policies of business are being formulated. In our company we have taken a rather elementary step in inviting our employees to collaborate in policy making. Each month, a Management Board, composed solely of representatives from our stores, holds a seven hour meeting in our Director's Room. Out of these discussions come recommendations on all phases of the business. These recommendations, many of which are highly constructive and often novel, are transmitted to the top executive staff. Either each recommendation is adopted or a written explanation of the reasons why it is impractical is submitted at the next meeting of the Management Board. This board has the privilege, and frequently takes it, of asking any officer or staff member to appear before it for consultation.

However, participation in policy making in itself is not enough. Man is essentially a selfish creature. An old philosopher once said that whatever is to be done with mankind in terms of progress must be done within the framework of human nature.

Whether you like it or not, all those who contribute to the fruits of labor should share in them—that means, among other things, sharing of profits. This sharing is usually done by collective bargaining. That is all right as far as it goes, although if you look in the dictionary you will find "haggling" and "dickering" are synonyms for bargaining. Collective bargaining is not generally considered the ideal medium for increased productivity. Above and beyond collective bargaining must be a collective approach so that labor and business will profit together as a team in the public service. Otherwise the pie that is to be divided will become a constantly smaller one. Profit sharing is just plain good business.

INCENTIVE FOR MANAGERS

One way in which we in Grand Union have tried to divide this pie is through giving our managers a share in the profits of their stores. Some years ago we had half a dozen stores that were losing so much money that we were prepared to close them. We explained to the managers that these were the most unprofitable stores in our company and that for one year they could have one half of whatever they made. Generous, weren't we? Well, it turned out we were. In six months every one of these stores showed an operating profit.

This encouraged us to put all managers on a carefully worked out profit-sharing plan. The results were little less than sensational. It is no accident that Grand Union's earnings have been mounting ever since. Our managers are now enterprisers. Now the thought may be passing through your minds: How about the bad years? Well, we have tried to anticipate these by accumulating, as part of our plan, a very substantial reserve earmarked to supplement our managers' earnings if and when profits decline.

EXTENDING PROFIT-SHARING

More recently, we instituted a test among a large group of our stores where even the clerks participate in the profits. This test will be run for one year, so we are not ready to announce the results with any certainty. At the end of the 3rd quarter of the test, however, the sales of these stores were showing greater improvement as a group than those of any other similar group in the company. These stores are also leading the company in increases in production per man hour. The clerks in these test stores are watching expenses as never before. The object of this test is to make our clerks enterprisers, too.

We believe that profit-sharing in itself is a way of preventing many labor difficulties. I don't say that our profit-sharing plan will work in your business, but I do say that if an employer sincerely tries to reach the objective of having his employees participate he will find a way of doing so. Let's share profits while there are still profits.

Collaborating in policy-making and sharing profits are not the only ways in which employees may participate.

The worker must participate also in the fruits of his labor through payments deferred until he can no longer work. This means that into the cost of each product should go a charge which represents a share in that product which will be given the worker upon his retirement.

PENSIONS AND PRODUCTIVITY

There is a school of thought that holds we should be dependent exclusively upon our government for pensions in our old age, but unless we are prepared to accept a socialist philosophy—such pensions should cover only the minimum needs of our people. Should not the chief source of income for the retired worker come directly from the fruits of his efforts? And should not the rate be in direct proportion to his productivity during his working years? In this way we shall provide real incentives for every man—no matter what his job may be. This is another way of increasing our chances of avoiding a hand-out state. This is another way to make every man an enterpriser.

Now, as is always the case when great changes are being made in our economy, there are those who try to stop the wheels of progress by drawing red herrings across the issue. They say their companies are in business to make money, that they can't afford profit-sharing plans or pensions or other methods of participation, that they will add to their costs and they will no longer be competitive. Scores of successful companies have demonstrated that participation plans are not burdens to their businesses. On the other hand, they actually have increased productivity and earnings. Look for a progressive company and you will find a prosperous one.

I have mentioned three principal means by which we may strengthen our American business system through participation—three ways by which we may make our employees enterprisers. No dogmatic rules may be laid down that fit the situation of every company. Grand Union's methods are not necessarily unique. Such examples as were given here are described merely to indicate the general direction participation may take. There are measures other than participation that may be taken to cause the worker to feel that management is sincerely interested in his welfare. In Grand Union we try to develop the human side of our business in many small ways. You might call some of these methods paternalistic. But they do work.

SHOWING PERSONAL INTEREST

For example, in our organization, whenever a baby is born, a personal letter goes out and a gift is sent under separate cover. The same procedure is followed for an employee wedding. (Possibly I have those statements in the wrong order.) There are dozens of similar small things we do for our employees—that we believe add up to greater productivity and pay off in the earning statement.

In our own way we have tried to make our employees feel that they are important participants in the business, that they are Grand Union, that the company's success is their success, and that the company is interested in helping them live happy and useful lives. It might well be that this is another way of preventing our workers from becoming wards of a socialist state.

Although we may succeed in making our employees enterprisers, this does not solve completely the problem of insuring the public's acceptance of our American system. We cannot depend solely upon our workers to change the public's attitude toward business.

ENLISTING ADVERTISING

Could the almost inconceivable ignorance of how American business functions continue if the advertisers of America were to spend only a tiny part of their annual budget of nearly five billion dollars in education campaigns explaining what American business has done for the American people? Possibly our advertisers could skip spelling the name of their products backwards a few times or take a chance on having fewer men of distinction in America, and instead have some better informed citizens.

Here and there occasionally you will see an institutional ad. It is significant, though, that when such an ad appears, you will usually find that the company is under direct attack by the government. Business is generally "letting George do it" . . . and George is doing it only when he is fighting a battle.

H. A. Overstreet, in pointing out the tremendous power of American advertising in his book, "The Mature Mind," says, "Advertising has found its formula: Get a person to want something for himself, and want it badly enough, and a sale is made." Here is the formula each one of us may well apply in selling not only the products themselves but also the system that makes these products possible.

The American way has given the average man advantages of which his forefathers never dreamed. But at the same time the industrial state has tended to standardize his thinking and actions, it has jeopardized his security, and it has taken away much of his liberty. More and more the opportunity for the individual to create . . . to share in direct proportion to his contributions is being leveled off under the impact of collectivist forces.

The future of our American system depends upon the extent to which we restore these opportunities to our people. This is the challenge that American business is facing. It is the challenge of making every man an enterpriser.

Proposed Amendment to By-Laws

In accordance with Section X of the S.A.M. By-Laws, which requires any proposed amendment to the By-Laws to be published in a general publication of the Society, Advanced Management *publishes the following:*

Be it Resolved that the By-Laws be amended by the prescribed procedure to set the minimum number of members required for the granting and continuance of a Charter at 25 instead of 15 as the By-Laws now provide, and that those Chapters now having less than 25 members in good standing be so advised by the Vice President in charge of Chapter Operations.

Time Study Research

Part II — Rating

By M. E. MUNDEL

Professor of Industrial Engineering,
Purdue University

Further development of the secondary adjustment in rating time studies. "Pace" and "effort" are analyzed to construct a rational, universal basis for determining comparative "job difficulty".

THE steps in the application of the procedure outlined in Part I (*Advanced Management*, June 1950) are as follows:

1. In actually taking time studies, the first requirement is an objective, such as any specific version of the definition of standard given at the beginning of this article such as:

> *The standard time for a job will be the amount of time that will be necessary to accomplish a unit of work, using a given method, under given conditions, by a worker possessing sufficient skill to do the job properly, as physically fit for the job, after adjustment to it, as the average person who can be expected to be put on the job and working at a pace 100/130 of the maximum pace that can be maintained, day after day, without harmful physical effects.*

2. The second step is to obtain some physical representation of this. This may be done in any one of three ways.

A. It is possible for a time study man, or department, to take a simple job involving practically no skills or special aptitudes and to determine experimentally the pace on this job when performance meets the requirements of standard. This may be accomplished by determining the maximum pace and then taking a pace 100/130 of this, i.e., 130 per cent as much time for standard as for maximum, since the maximum pace is, by definition, 30 percentage points faster than standard. This may require some experimentation with several operators. The same technique may be used no matter what the definition of standard is, but the percentage will change.

B. The time study department may make a series of films of workers working at different paces on simple jobs and ask management to select one of these as representing their concept of standard pace. It is true that judgment must be exercised here and some original error is possible but this is not of prime importance. At least a standard of unchanging pace is set up. Also, if management wants to assume this prerogative, it should be assumed at a high enough level.

It is worth noting that the pace selected may also be jointly negotiated by labor and management in which case its actual relationship to expectable performance is of less consequence and may be determined later through experience with its use. At least it will be acceptable to both parties and without such mutual acceptance joint agreements concerning money per hour appear inadequate to say the least.

C. As another procedure, simple jobs may be shown to large groups of industrial engineers and the corrected (for different concepts of standard) values averaged and used as a basis for the standard pace. Lehrer[3] was able, by presenting, in random order, a whole series of different paces on a single job to a group from the *Indianapolis* Chapter of the *Society for the Advancement of Management* to obtain a realistic embodiment of their group concept of standard and step-by-step deviations above and below it.

SELECTING OBJECTIVE BASIS

The final phase of the second step in the procedure being outlined here is the formal selection of at least one film showing the standard rate of activity with any one job or set of manual movements. This film represents the unit of measurement, or the rate of activity representing 100 per cent standard pace. With a record of this type, the standard rate of activity may be actually included in the labor contract. At the very least, it is available for comparison and for use in placing discussions of ratings on an objective basis.

This is still, however, not enough for actual use. It is highly desirable, to prepare films showing step-by-step deviations from standard pace on a job, (step films), so as to establish markings on the scale of rate of activity and to facilitate the rating. All of the films may be in loop form; that is, the front end spliced to the back so as to permit continuous projection for any period of time. Also, films may be made with the frames divided into different areas, each area showing a different pace, so that a group of steps may be projected at once with one projector.

In practice the time study man may therefore do one of the following:

A. Compare the observed job with his concept of the scale of standard pace as obtained by considerable exposure to the step films.

B. Compare the observed job to the step films projected into a

(See page 22 for all references to Bibliography)

shadow box near the job so the two may be viewed simultaneously.

C. Compare a film of the observed pace with the step films with simultaneous projection by two projectors.

In any of the above cases the time study man (or anybody else performing the rating) must only judge whether the job being studied (actual performance or film of performance) is being performed at a pace (rate of activity) equal to any one of the step films or between any two of the steps and then assign a rating as indicated by the assigned values of the steps. He pays no attention to job difficulty and its effect on the possible pace for the task. It should be obvious that once a standard pace has been selected by any one of the procedures which were enumerated, the step films may easily be prepared. Experiments have shown[8] that probably about 6 per cent change in pace is the usual minimum detectable difference in pace, hence, the steps should approximate this magnitude.

"STEP" FILMS AID ACCURACY

As a final experiment to evaluate the theory outlined, a group of time study men were asked to rate a series of jobs by the procedure of comparing the unknown job with the step films rather than against their own concept of standard.[3] The same group of experienced time study men previously mentioned, who, using conventional methods, were able to place only 19 per cent of their ratings within $\pm$ 5 per cent of the correct value and 42 per cent within $\pm$ 10 per cent were, on the other hand, able to place 64 per cent of their ratings within $\pm$ 5 per cent of the correct value and 87 per cent within $\pm$ 10 per cent when using such step by step films.[3] These results are unusually significant when viewed with the realization that this group of time study men all had over a year's experience with conventional procedures yet increased their accuracy by this significant amount on the first series of trials with the step films. While it is true that the jobs used were simple, they were similar in both cases and other variables such as familiarity with the tasks were equal under both conditions. In addition, the differences were statistically reliable.

Hence, it is reasonable to suggest that the use of step films as a guide to rating offer a reasonable chance of obtaining the requisite accuracy of time study.

A word of caution is appropriate at this point. The observer must fully realize what is meant by *pace* or *rate of activity* or *speed of movement.* Experiments have shown that ratings of films when compared on the wrong concept of pace may lead to gross errors. Untrained observers, asked to compare two films in respect to pace tended to compare the average velocity of body members performing movements of different length or to compare tempo in terms of movements per minute.[9]

MECHANICS OF MOTION

Some understanding of the basic mechanics of human motion is required. It has been found[10] that the hand or arm, when making a movement, accelerates for a relatively constant portion of the distance traveled, moves at constant velocity for another relatively constant portion and decelerates for another relatively constant portion. These proportions do not appear to be affected by the pace.[11] The percent of time spent in acceleration, constant velocity and deceleration with free movement appear to be in the neighborhood of 40, 20 and 40 per cent respectively.[10] Now one of the basic laws of physics is the equation, Force = Mass x Acceleration. In respect to human motions this may be interpreted as, the application of any given muscular force to a body member with other variables constant, will produce a proportionate acceleration.

It would therefore seem reasonable to define pace or rate of activity as the rate at which muscular force is applied to the creation of body, arm, hand or finger, etc., movements, disregarding the job difficulty, and hence, as the rate of acceleration of a body member engaged in work. The preceding information has been given to explain a reasonable, yet at first glance, peculiar, phenomenon. If the time for a given distance of body member movement, such as a movement of the arm about the elbow, is determined, a good deal less than twice the time will be required for twice the distance of movement at the identical pace or rate of activity or required rate of application of muscular force with unhindered movement, all three being synonymous. If equations for distances are set up as a function of time it will be found that for a given rate of acceleration A, the time will increase as the square root of the ratio of distances with an increase of 100 per cent (double original) distance accompanied by approximately a 41 per cent increase in time.

This statement is at variance with previously reported data in Deegan, W., "The Development and Use of a New Technique for Measurement in Time and Motion Study", *M.S. Thesis,* Univ. of Iowa, 1935; Barnes, R.M., "An Investigation of Some Hand Motions Used in Factory Work", *Univ. of Iowa Studies in Engr.,* Bul. 6, 1936. In these studies operators were asked to make 5, 10 and 15 inch movements at a pace they felt they could work all day. Although a mathematical analysis of the time at a given pace would give time values of (with the 5″ taken as 100%) 141 per

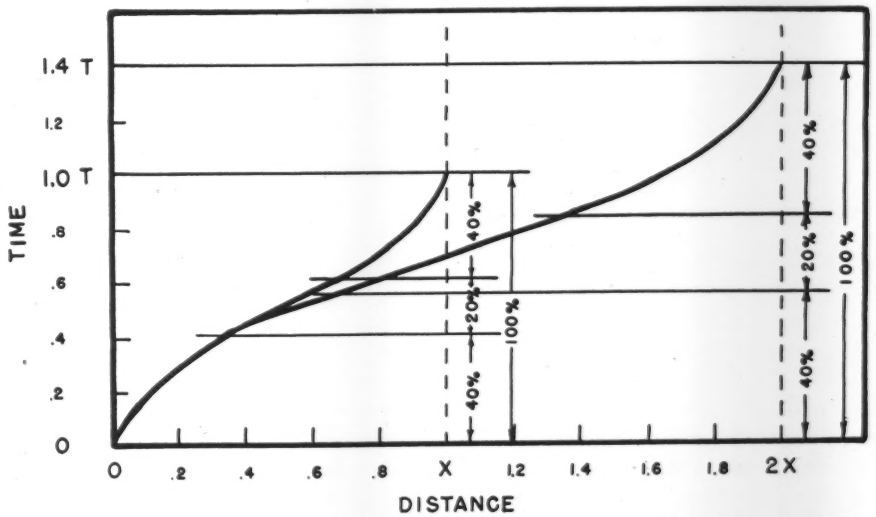

Figure 1—*Example of relationship between Time and Distance of Body Member Movement with "Pace" or "Rate of Activity" remaining constant.*

cent for the 10 inch and 173 per cent for the 15 inch movement, only 110 and 115 per cent were obtained in the experiments referred to, probably due to the operators unconsciously imposing a similar tempo on all three jobs. Actually, with a 10 inch movement being performed in only 10 per cent more time than a 5 inch, the rate of acceleration must be higher, (although it will be applied for the same proportion of the movement) thus the rate of application of muscular force must be higher, consequently the pace, as we conceive of it, is higher.

The distance-time diagram of Figure 1 shows the effect of increased distance on the time for an arm movement with an assumed rate of activity as defined.

Consequently, it may be seen that the average velocity of a body member movement is not the correct guide to use to judge pace but what must be judged is the rate of acceleration at the inception of the movement and the rate of deceleration at the conclusion of the movement. It is also worth noting that micromotion analyses usually reveal that most of the time, with an effective method (particularly on small jobs) is spent on the red-blue or terminal group of therbligs rather than on the green or movement group. Therefore considerable attention should also be paid to the rate of activity with which the small motions of these terminal therbligs are performed.

OTHER CONDITIONS

Throughout the entire preceding discussion no attention has been paid to external conditions such as weight moved, eye-hand coordination required, or any of the factors except apparent pace, although these other factors also control the amount of muscular force required. This was intentional inasmuch as no consideration can be given to these in the first judgment of pace which is made in comparison with a standard. Otherwise, a separate standard would have to be used for each job and the procedure would resemble the typical conventional methods with most of its drawbacks. Thus, the fourth step in the setting up of a rational time study procedure is the determination of a table of secondary adjustment so that the time obtained by time study, after being adjusted to standard pace, may be further adjusted to represent the rate of exertion defined in the definition of standard, for the actual job being studied.

It is obvious that all jobs could not be performed at the standard rate of activity, since some of them are more difficult than others; some involve heavier parts, closer visual work, and so forth. These job differences will place different limits on the rate of activity possible on each job, but they may be objectively evaluated. The method will consist of determining the various factors that make for difficulty in the job, evaluating them, and including a *secondary adjustment* in computing the standard for the job so that all the standards will be consistent in regard to attainability. As will be shown in the next article, these secondary adjustments may be set up in tabular form.

SUMMARY

In actual use, once the standard unit is set up, this rating system will involve two steps:

1. Relating the performance to the standard rate of activity by judgment. The time study department in which the time study man works, or the time study man himself, if he is the only one engaged in that activity, will determine, by training operators and experimentation, or by an adaptation of available standards, a physical representation of the standard rate of activity as called for by the definition of standard which management aided in formulating. As alternatives, management may aid in selecting a pace or a joint management-labor committee may select it. The time study man should then become familiar with various possible paces, and their percentage of standard pace. When the time study observer is taking a time study, he compares the rate of activity of the operator, on each element, regardless of the difficulty of the element, to the standard rate of activity or the calibrated steps thereof (three procedures were given) and expresses the relationship in per cent of standard: 95 or 90 per cent etc., if the actual performance he sees matches one of the slower rate of activity step films, or 105 or 110 per cent, or so forth, if it matches a faster step film. This percentage is the rating for the element. Experiments have shown that this can be done with a more reasonable degree of accuracy than conventional rating or leveling. On machine-paced elements, the rating is, of course, 100 per cent.

2. Applying secondary adjustments by evaluating the difficulty of the job as compared to the job used to demonstrate the standard rate of activity and steps thereof. It should be noted that the secondary adjustments are a function of comparative difficulty. If the standard rate of activity was 30 per cent below the maximum maintainable pace on a job involving the moving of 50-lb. weights, then other jobs might have negative secondary adjustments when they involved lighter weights. However, it is psychologically preferable to select a standard job such that all secondary adjustments are positive. The development of a set of secondary adjustments and their application is discussed in the next article.

The use of step films of pace (with one being standard) and a fixed table of secondary adjustments makes possible the inclusion of a completely objective basis for work standards in the labor contract, where such inclusion is desirable, and whether included in such a contract or not, should lead to better standards and increased industrial peace.

(Part III will appear in the September issue of Advanced Management)

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Methods Training in Educational Institutions

By V. DONALD SCHOELLER

Wharton School, University of Pennsylvania

Coordinating Methods Training with the practical needs of Industry. How Industry and Education both benefit from the use of modern laboratory facilities applied to actual production problems.

EVERY day we hear of more and more schools that are installing Methods Laboratories and are beginning to teach methods work. Perhaps the "Educational lag" has run its course and the principles of motion economy and work simplification fathered by Taylor and the Gilbreths are at last being added to the curriculum of our colleges and universities.

Some of the laboratories I have visited and read about are representative of large investments in time and money. *New York University* has spent over $30,000 in new equipment and facilities for its *Industrial Engineering Laboratory*. Our funds for new equipment and maintenance at *Wharton* have been substantially increased by a bequest from *Mrs. Taylor. Purdue University* under the direction of *Professor Mundel* has an outstanding laboratory and enjoys considerable cooperation between industry and education in the area. Many of our outstanding Industrial Engineers received their basic training there and several industrial projects are presently being worked on in the laboratory. An article in the June, 1949 issue of *American Machinist* calls attention to the production laboratory representing 2 million dollars worth of machine tool equipment and $250,000 worth of construction and layout expense in the installation.

Michigan State University's Industrial Engineering Laboratory works closely with the Mechanical Engineering Group and actually manufactures, on a project basis, small air compressors. *Stanford University* has a complete machine shop and laboratory for teaching methods and time study. A recent description I received of this laboratory pointed out that the students designed the layout, materials, materials handling, methods, and time standards for the complete production of a circular saw, and then set up the shop and actually produced the saws.

The College of Business Administration at *Boston College* has a $30,000 laboratory that contains a wide assortment of general purpose machines basic to most industries—engine lathes, bench lathes, milling machines and drill presses, tool grinders, power saws, shapers, surface grinders, and other minor tools of production. There is also a tool crib, a stockpile of raw materials, to say nothing of stop watches, timing devices, photographic equipment and tools of measurement. Every student in the field of industrial management spends two hours a week working in this laboratory. He knows not only what a lathe looks like, but also knows how it operates and how it feels to operate one. In class he may be studying various aspects of his chosen field, such as purchasing, labor relations, personnel management, production control, motion and time study, or cost control. In the laboratory, particular problems involved in those fields become his personal problems.

EMPHASIS ON PRACTICE

This type of instruction leaves the theoretical and goes directly to the practical. In order to simplify work, the analyst should understand the work thoroughly. What better way to have him understand the operation of machines than to have him operate one himself? It is often too late once the student is out in industry, not only because the machines are tied up, but also from the reaction of labor on two points:

1. If the operators see methods trainees having trouble learning they lose respect for improvements these men may develop.

2. Labor often takes a dim view of a trainee operating production machines or doing any kind of work on the basis that it does a union man out of a job by the extent of that production.

Therefore, with the task of methods training becoming difficult, (if not impossible in some plants) on a practical basis, is it not logical to turn to the laboratory in an educational institution? I might point out here that it is not intended to convey the impression that the situation is universal. Some plants have special problems which only they can teach to their own people under their own particular conditions. Laboratory work in an educational institution is essentially of the practical preparation nature and unless the student gets actual "firing line" conditions such as when he is devoting part time to the educational laboratory and part time to actual work (as when the course is given in the night school) he must necessarily still spend some time under competent supervision before he can be of tangible assistance in most methods work.

Students remember best what they learn by personal experience. Therefore,

when they leave the educational institution that provides laboratory training and start in Industry they have some basic facts to go on. At least, they have been formally introduced to the machines and equipment they will see in industry. They have a first hand working knowledge of what makes a plant tick. They have studied plant layout with three dimensional models. They have changed the layout of offices and stock rooms. They understand why desk height and posture chairs are necessary because they have worked in awkward positions. When they go out to look at the method on a particular job they can really visualize the position of the operator and immediately spot the trouble with the method. Long hours, weeks and months of training and indoctrination by the employer are substantially reduced. They should still be closely supervised, but in case they are not, the first mistake they make may not result in a serious loss, because they know some of the tricks of the trade.

Too often a new employee in methods work permanently damages his reputation with the workers by having the wrong attitude in gathering facts. The same thing can be caused by carelessly recommending some "impractical" improvement without first clearing it with his supervisor. When he is in the classroom with fellow students, he can take a good "riding" for a hasty, ill-founded suggestion, but when the same suggestion is made in the shop, it is over the "grapevine" in a short time and he may never live it down.

The student is taught not only the mechanics of methods improvement, but is given the fundamentals of human relations that are a necessary part of this work. Case examples from the experience of the instructor, lectures by men from industry, current problems of local industries, prepared skits acting out particular approaches, reviews of grievances and arbitration awards, are all used to give the student an appreciation of the human relations problems involved. One of the most important practical approaches used is to have the student actually sell his project to the company involved.

In my own groups, where industrial problems are involved, the project is not acceptable to me unless it is first sold to the company by the student and is installed. Where non-industrial jobs are involved, the student must "sell" all points of his project to the instructor exactly as if he were a company representative.

IMMEDIATE VALUE

We may say, therefore, that Methods Training is on the increase in educational institutions, but of what value is such a program going to be to industry *today; right now; and not in the future.* It is going to take time to get all these programs into high gear, but it is *right now* that industry needs the people and the improvements. It cannot wait; costs must be reduced and production increased immediately. Are these not the arguments that are being put forth as reasons why industry has to install its own methods training program? Certainly they are, but in my opinion industry is missing one big bet. It has overlooked the fact that these laboratories can be used *right now* for methods work. That the facilities are there and that the trained instructors are there and in such quantity that industry cannot afford to duplicate them.

The most elaborate methods laboratory I have seen in Industry would not hold a candle to some of the laboratories I have seen in educational institutions. What is being done in these laboratories that have been set up by Universities? Some of them have started "Conferences", "Seminars" and "Round Tables" for people from industry, where the outsiders come in for a day a week or two or three weeks and work on particular jobs. *Ralph Barnes* pioneered this phase for many years and *Alan Mogensen* with his *"Lake Placid"* conferences is doing a wonderful job. We are starting a conference in *Work Simplification in the Office and Shop* at *Wharton School.* All of these conferences are extremely valuable and pay great dividends to the companies that send conferees. Very often, the methods improvement project that the conferee brings with him to the conference more than pays for his participation in the savings accomplished. The laboratories can, therefore, be used during the summer and other vacation periods as actual methods laboratories for industry, with people from industry and on a basis that discussion with other concerns' representatives will possibly solve a problem in your own plant.

In addition to the conference technique, the laboratories can be used as a service to industry in the area it serves. Too often, the "methods improvements" worked on by the students are demonstrations of jobs that have been previously solved and are therefore only hypothetical problems. My suggestion is that industry work out a plan with the university laboratories whereby the students will work on actual jobs in plants from the area. You would be surprised at the limitless possibilities there are for suggestions in a group of students. We have taken micro-motion pictures of jobs that were either too complicated or too large to bring into the laboratory. Students have brought in paperwork jobs, mechanical assemblies, packaging jobs, electrical wirings, layout problems, materials handling problems, filing jobs, and a host of other small jobs that they found in their plants, in plants where members of their families worked, and even from the home. Work has been done for the physically handicapped to permit shut-ins to perform work of a light assembly nature that can be brought to them at their home, and serious production problems have been solved in the lab by bringing in "bottleneck" jobs and improving them.

MUTUAL BENEFITS

Here are limitless possibilities for industry and for students to mutually benefit. Industry can benefit by having methods work done that either could not be done in their plant or that the methods department was too busy to tackle. This can be done at the cost of material or, at the most, a very nominal fee. The student can benefit by working on actual jobs, which is not only good experience, but is an added impetus to do the best possible job.

This is, I believe, the key that unlocks the whole puzzle of methods training. Participation in an actual methods improvement, not on a hypothetical job that has already been solved by the instructor or someone else. I have operated under both systems, and there certainly is no possible comparison of results. When a participant works on an actual job that can give actual dollars and cents savings in a particular company, the reaction is entirely different than with the student who is merely working for a mark in a course.

In order to obtain the necessary methods projects from industry, close cooperation between the concerns in the area and the university must be established. Both industry and labor are likely to look with disdain upon such a project, and the selling job often is more difficult than it usually would be for the concern's own Industrial Engineer. Questions that frequently are hurled at the instructor are: "How can a bunch of students simplify work when they have had no experience in our type of production?", "Our process secrets will be broadcast to the world." "How can you keep the students from interfering with our industrial relations?" These, and many other questions must be answered before the project can be undertaken. Where satisfactory solutions have been worked out, highly successful programs have been started.

At the present moment there are more than 25 methods projects for various companies in the Philadelphia area being worked on in the Laboratory at Wharton. These projects represent a cross section of all types of methods improvements ranging from paperwork simplification to the re-design of electrical equipment to facilitate better assembly. During laboratory sessions, fixtures are under construction, layout diagrams are being prepared, micro-motion pictures are being analyzed, groups are redesigning office forms, packing procedures are being rearranged, conveyors are being designed, soldering operations are discussed, and even the scrubbing of the floor is being improved for a local hospital.

One of the basic requirements is that the new method must be sold to the management and the savings verified by the company in question. Selling projects is therefore not a lecture question to be discussed on a teacher-pupil basis. but it is a real threat to the success of the project at hand for the student. One electrical assembly project has already shown the possibility of a reduction in time of over 60% and the item is an extremely high production item. In the sorting and packing of glass vials several improvements have already been made with more in sight. Previous projects have resulted in production increases of well over 100%, all of which cost the companies involved nothing except the cost of materials for jigs and fixtures.

One company alone has at the present time six separate projects in the laboratory and substantial savings are being realized.

Industry, on a purely selfish basis, needs to sponsor university research to insure a curriculum that will keep pace with current problems. Industry is too often prone to look upon the educational institution as being responsible for the so-called "Educational lag" and decry the fact that most students, when they leave college are not fit to immediately take an active part in management.

Why are we seeing more and more concentration on the training program in industry? A great part of the answer lies in the fact that something is missing from the course material offered by the educational institution that the company feels necessary to teach to the new employee before giving him an active part in company affairs.

I am not referring to a basic indoctrination into peculiarities of the company itself, because this problem is there regardless if it is a student you are bringing into the company or if it is a seasoned man who has had years of experience with outside concerns. What I am referring to is, specialized training in the operation of the business. The "How to do it" techniques have been sadly neglected by educational institutions under the guise of giving the students a "broad general knowledge".

A better approach to the problem may well be for industry to sit down with the Universities and acquaint the educators with their needs and assist the educators in setting up courses that will give industry the special skills they want in the new graduate. During a recent survey about a new course in Office Methods many companies we consulted expressed amazement that the subject was being taught. Many companies had shop methods training, but had left office methods training up to the accountant or office manager without regarding it as a specialized technique that could be formalized into a University course. A few concerns had already started programs for Office Methods training, and expressed extreme interest in the program and offered their help in setting up the course. As one of the executives put it, "You train them and we'll hire them." What he was thinking of was the expensive training program that could be reduced, or perhaps eliminated in time, if the men coming out of the University could already have the "Know How" the company now found it necessary to teach them. Similar attitudes have often been expressed on the subject of specialized methods training at the University level.

Everywhere we hear, "We have to get rid of excess fat in overhead and work methods generated during the war and the postwar sellers' market years." How to do it? One of the usual answers is to give a Work Simplification course, using either the company industrial engineer as the instructor, or to hire an outside consultant or lecturer to give the course. Whatever the method of attack, the answer is still that Industry is assuming the burden and paying out dollars in training expenses. Many of these training functions could just as well be performed in an educational institution. Adult education programs and evening school programs in our Universities are beginning to install courses in Work Simplification and Methods. We have had them at Wharton for over 8 years and they have always been well attended.

Industry will have just as much methods training in the Universities as it promotes and asks for and no more. If Industry is going to be content to sit back and complain about the lack of methods training without trying to do something about it, then the "A.B. type of training" will be the characteristic of our educational system and specialized training will have to be done by Industry. If, however, Industry will take a vital interest in the curriculum of our universities and will give advice and counsel on the type of training needed to perform the specialized tasks required by our modern industrial system, then, methods training can be performed where it will do the most good.

The possibilities of savings are not some distant thing remote in the future but they are here and now, and are being realized by concerns who have seen the possibilities and have taken the necessary steps to cooperate with the Universities and obtain the savings.

It is through training such as this that managers of tomorrow will gain an effective knowledge of Methods Improvement.

SOCIETY NEWS

THE LABOR MANAGEMENT INSTITUTE of the University of Connecticut conducted a conference on August 10th devoted to *"Korea's Impact on Industrial Connecticut"*. Myron H. Clark, Director of the Institute, and George S. Paul, General Chairman, keynoted an informative series of panels on arbitration and industrial mobilization. Chester Bowles, Governor of Connecticut, addressed the dinner meeting.

PROFESSOR R. PARKER EASTWOOD has been appointed as assistant dean in charge of Columbia University's program of part-time studies at its Graduate School of Business. In his new capacity, Assistant Dean Eastwood will administer a program designed for college-trained men and women in business who want to study simultaneously for graduate degrees.

BRUCE PAYNE, of the Westport Chapter has been elected president of the Harvard Business School Association. He will direct the activities of the 16,000 alumni of the University's Graduate School of Business.

DR. JOHN F. MEE, Director of Research and Development for the Indianapolis Chapter, has been appointed Director of the Committee to Catalogue Men and Women for Government Positions, Washington, D. C.

WORK METHODS MANUAL by Ralph M. Barnes, originally published by John Wiley and Sons, Incorporated, of New York, has been translated into Spanish and the Spanish translation (MANUAL De METODOS De TRABAJO) has just been published by AGUILAR, S. A. De EDICIONES, Madrid. An introduction to the Spanish edition was written by FERMIN De La SIERRA, and the translation was made by SATURNINO ALUAREZ, both industrial engineers in Spain.

DR. EDWIN F. PIKE, Chemical Engineer Consultant, has joined Wallace Clark & Company, Inc., international management consulting firm of New York. In his new post he will act as Special Consultant on work for clients in the chemical industry.

Emerson Trophy Standings
Chapter Performance Award Plan — As of June, 1950

Washington	4130
Cleveland	3903
Philadelphia	3184
Pittsburgh	2280
Cincinnati	1833
Chicago	1781

NORTHEASTERN UNIVERSITY evening School of Business announces a new series of Labor Relations Institute courses to begin January 29, 1951. Some of the subjects covered will include Labor Management Relations, Time Study, Job Analysis and Evaluation, Human Relations, and Industrial Psychology. Details can be obtained from Northeastern University, 360 Huntington Avenue, Boston 15, Massachusetts.

MILWAUKEE CHAPTER recently visited the Harley Davidson Motor Company plant.

ARTHUR D. LITTLE, INC., has prepared a selected bibliography of books and articles on *"Management of Industrial Research"*. It is available to SAM members on request.

CORNELL UNIVERSITY cooperating with the New York State Education Department conducted a joint professional conference for teachers of industrial education August 14th through August 16th at the New York State School of Industrial and Labor Relations.

RALPH M. BARNES, Professor of Engineering and Production Management, University of California, Los Angeles, visited Oslo, Norway and Stockholm, Sweden this summer as consultant for the Industriforbundets Rationaliseringskontor (Federation of Norwegian Industries), the Federation of Swedish Industries and the Federation of Swedish Employers. These associations of manufacturers are interested in increasing productivity of their factories and increasing the standard of living in Norway and Sweden.

A three-week Management Course was conducted by Professor Barnes and his staff presenting, in a systematic way, American management and engineering "know how." Following this session a shorter conference was held in Stockholm. Assisting Professor Barnes with the Conference were the following engineers from the United States:

M. R. Lohmann, Professor of Industrial Engineering and Vice Dean, Oklahoma A. & M. College, Stillwater, Oklahoma.

Lee S. Whitson, Professor of Industrial Engineering, College of Engineering, University of Minnesota, Minneapolis, and consulting engineer, Minnesota Mining and Manufacturing Company, St. Paul, Minnesota.

B. A. Lindberg, Professor of Administration, Harvard University, Boston, Massachusetts.

Professor Barnes also visited industries in Norway, Sweden, Denmark, and England.

TRENTON CHAPTER OFFICERS 1950-51, Left to Right: Albert H. Bergen —Chairman of the Membership Committee, Clifford S. Bloom—Secretary, Joseph R. Ryan—National Director, Oscar Dull, Jr.—President, Clarence Marten—Chairman of the Program Committee, Alexander F. Hammell—Treasurer, Robert C. Ruehl, Jr.—Executive Committee Member-at-Large.

The Management Bookshelf

The Fatigue Allowance in Industrial Time Study by MATTHEW A. PAYNE, 13777 Euclid Ave., E. Cleveland 12, Ohio, 66 pp.

HAVING frequently recommended Mr. Payne's book to timestudy men, this reviewer welcomes this opportunity to give formal recognition to a small, but not trivial, work that appears to be the most balanced and intelligent treatment to date of an involved and controversial subject.

It is conceivable that many readers will be disappointed because of the author's failure—or perhaps we should say refusal—to produce a cut and dried formula for the universal application of fatigue allowances in work standards. It is true that in an appendix there is presented an organized approach to the establishment of fatigue allowances, but it contains no actual allowance figures. Such figures the student is expected to work out for himself in the light of local conditions and after developing in himself an appreciation of the economic, social and philosophic aspects which Mr. Payne presents with no little discernment as his theme unfolds.

The book itself is little more than a pamphlet, running, without the bibliography and appendix, to 47 pages and much of this space is taken by quotations from a wide variety of authors. Mr. Payne's own writing consists mainly of brief objective comments on the statements of others and is given continuity by his clear understanding of the broader aspects of the subject.

A brief preface deals with the proper use of empiricism and common sense in the absence of measurement and of rigid factual data. This is followed by an equally short introduction stating the author's intention of giving an unbiased appraisal of current methods and philosophies.

Following a few relevant but brief historical notes we are led into a discussion of the nature of fatigue and its physical and mental effects. This demonstrates the fact that fatigue has great individual variations and is neither definable nor measurable because it is not homogeneous. From this it follows that, until further data are available, we must proceed on a basis of pragmatism and judgment moulded by all the knowledge available.

Subsequent chapters deal in similar vein with the methods of determining and applying the Fatigue Allowance, concluding with a clear summary showing the complexity of the factors bearing on fatigue and giving suggestions as to the type of thinking essential in seeking a practical solution of the problems. To all who are prepared to combine rate-setting with serious thought, this little book is highly recommended.

BY RALPH PRESGRAVE
Vice President,
J. D. Woods & Gordon, Ltd.

"Problems in Personnel Administration" by RICHARD P. CALHOON, Harper & Brothers, N. Y., 1949.

"WHY is there such a wide difference between personnel functions in various companies? Why, in some organizations, does the personnel man have little better than a clerical status, while in others he rates with top management?"

These are two samples of questions with which this book deals in a thorough soul-searching survey of the personnel field. As a handbook for practical businessmen this book can be used as a yardstick against which to measure their personnel practices with those of over 500 companies surveyed by the author. For the student of personnel administration, this volume is extremely valuable in gaining a knowledge and appreciation of actual problems encountered in personnel work, which is lacking in most personnel textbooks.

The coverage of the book is extremely broad in that it realistically faces difficulties that must be solved in such areas as line-staff relationships, evaluation of personnel functions, presenting and selling personnel programs to top management and lower echelons, as well as those problems in specific areas such as employment, training, wage and salary administration and labor relations. (Workable solutions and alternatives which the author has gained in eleven years of practical personnel experience are presented.)

Used as a text, this book contains excellent teacher-aids in the form of problems, projects, and demonstrations which cover the material in each chapter. The personnel administrator will find these of interest, too, in reviewing his knowledge of sound personnel practice.

This book should prove to be a helpful source of information for stimulating not only personnel specialists, but all business executives, in planning and executing a progressive personnel program.

WILLYS H. MONROE
Personnel Testing Advisor
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